

Parkinson's Australia's Submission on the Notice under section 34AB of the Agricultural and Veterinary Chemicals Code: Paraquat and diquat uses – summary of assessment outcomes in proposed regulatory decision

Parkinson's Australia is the lead national advocacy organisation representing over 150,000 people living with Parkinson's wishes to comment on the use of paraquat, diquat and associated formulations in Australia.

The Neurological Alliance Australia is a collective of not-for-profit peak or national patient organisations representing an estimated seven million adults and children living with neurological or neuro-muscular conditions or neurological disorders in Australia, and it also endorses this submission.

Parkinson's disease is the world's fastest-growing neurological disease, and projections estimate that in Australia, that number is expected to triple by 2050 (1). The impact on the Australian economy, already estimated to cost more than \$10 billion per annum in 2014 (2), will also increase significantly.

Only a small proportion of Parkinson's disease cases can be linked to potentially causative genetic mutations, implicating that environmental exposures are major contributing factors to the disease (3, 4). Parkinson's Australia has long heard stories from individuals and families about the use of pesticides and the prevalence of Parkinson's in their area. Over the years, we have seen what we describe as "anecdotal clusters", a name that doesn't give respect or justify what agricultural communities are experiencing. We've heard stories of people who are living with Parkinson's and remember being a child/teen in the fields whilst crop-dusting took place. Yes, there is a long period of time between the recalled exposures and the development of Parkinson's as the pathology and nature of the disease is that it begins decades before clinical diagnosis (5) – but that's not a good enough reason to ignore these people's reality of why they have the disease. Furthermore, paraquat has been identified and replicated across numerous epidemiologic studies as linked to PD (6). These studies have looked at different groups of people and utilised varied analysis methods, far outnumbering the studies finding no association between exposure to the herbicide and the risk of developing the disease. Observational studies have found that occupational and/or ambient exposure to toxins like paraquat increases the risk of developing Parkinson's (4, 6-12).

A set of complementary studies also have identified that paraquat exposure may interact with known genetic and non-genetic risk factors for Parkinson's disease, resulting in an even larger increased risk of developing Parkinson's disease in some

cases (13-17). This is significant when you reflect on the generational inheritance of genes, lifestyle, habits, and environmental exposures, especially when on family-owned farms or wineries. According to a study conducted by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), approximately 88% of Australian farms were family-owned and operated in 2020.

Recent research, including a comprehensive study in 2024, underscores the significant health risks associated with paraquat, particularly its strong link to Parkinson's, high toxicity and no antidote to poisoning (6). Paraquat is extremely harmful to humans and animals and can enter the body through skin absorption, inhalation, or ingestion (18, 19). Ingestion is the most dangerous, with even a teaspoon of concentrated paraquat potentially leading to death due to respiratory failure, which can occur days or even a month after exposure (20). This toxic pesticide can damage various organs, including the lungs, kidneys, heart, central nervous system, liver, and spleen. Long-term exposure is linked to severe health issues such as kidney failure, rapid heart rate, reproductive health effects, and chronic lung damage). There are also noted cases of suicides by paraquat ingestion in Australia and around the globe (23, 24). The risk of PD increases with the duration and frequency of paraquat exposure, emphasising the cumulative effect of this toxic chemical (6, 25). Given the severe implications for public health, especially among farmers and rural communities, immediate action by the APVMA is necessary.

In a recent statement, the APVMA said the “ABC’s reporting [had] misrepresented the APVMA’s position, and the current scientific consensus”. It said the ABC’s claim that the APVMA relied solely on evidence from the findings of “an unpublished paper funded by the maker of the chemical, Syngenta” was “not correct”.

“The APVMA considers scientific information from a variety of sources when reviewing agvet chemicals to determine their safety, efficacy and potential impact on trade, in line with our legislation,” the statement said.

“To inform the paraquat proposed regulatory decision, the APVMA considered a wide range of studies relating to paraquat, including animal and epidemiological studies, as well as the conclusions reached by the US EPA.”

We underline this part of the APVMA’s statement because we ask that the APVMA consider the conclusions reached by the EU (27 countries) and over 60 countries that have banned paraquat already. See Table 1 adapted from Stuart et al. (2023).

Agriculture without paraquat is feasible without loss of production, Supplementary file 1 (26).

Table 1. Countries with full bans of paraquat around the globe (adapted from Stuart et al. Supplementary File1, 26).

| Country | Banned | Source(s) | Date accessed |
|--------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Kuwait | 1985 | Home (epa.gov.kw) Watts M 2011: Paraquat, Pesticide Action Network Asia and the Pacific (PANAP) Cooperation Council for the Arab States of the Gulf Secretariat (2015) General Pesticides Law (System) and its Implementing Regulation in the Gulf Cooperation. | 18/9/2024 |
| Switzerland n.b. both active chemicals [^] | 1989 2002 | Ordinance on Plant Protection Products (OPPP) PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 18/9/2024 17/9/2024 |
| Norway | 1995 | Legislation on Plant Protection Products (PPPs) - European Commission (europa.eu) Norway database on registered plant protection products (2022). Available at: https://www.mattilsynet.no/plantevernmidler/godk.asp?sortering=preparat&preparat=Alle&sprak=In+English | 18/9/2024 23/7/2024 |
| Cambodia | 2003 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides Prakas No. 489 on the Prohibition of Paraquat (PDF) | 17/9/2024 |
| Côte d'Ivoire | 2004 | Watts M 2011: Paraquat, Pesticide Action Network Asia and the Pacific (PANAP) CILSS (2011): Paraquat ban [in French]. Decision No.125/COOR/2011. Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) | 18/9/2024 |
| Malaysia | 2005-06 2020 | Paraquat Ban Announcement by the Pesticides Board of Malaysia (PDF) PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ UNEP/FAO/RC/CRC.18/INF/28 Paraquat: supporting documentation provided by Malaysia to the Rotterdam Convention. | 18/9/2024 |
| EU (27 countries) n.b. both active chemicals [^] | 2007-2008 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 17/9/2024 |

| Country | Banned | Source(s) | Date accessed |
|-----------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| UK n.b. both active chemicals^ | 2008 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 17/9/2024 |
| Serbia | 2009 | Official Gazette of the Republic of Serbia (2009). 41/09 Legislation on Plant Protection Products (PPPs) - European Commission (europa.eu) | 18/9/2024 |
| South Korea | 2011 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 17/9/2024 |
| Lao PDR | 2011 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 17/9/2024 |
| Burkina Faso | 2011 | Ministry of Agriculture and Hydro-Agricultural Development CILSS (2011): Paraquat ban [in French]. Decision No.125/COOR/2011. Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) | 18/9/2024 |
| Cabo Verde | 2011 | Ministry of Agriculture and Environment CILSS (2011): Paraquat ban [in French]. Decision No.125/COOR/2011. Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) | 18/9/2024 |
| Chad | 2011 | Ministry of Agriculture Ministry of Production, Irrigation and Agricultural Equipment of Chad / Ministère de la Production, de l'Irrigation et des Equipements Agricoles — Government Body from Chad — Agriculture, Land & Erosion & Soil, Water & Sanitation sectors — DevelopmentAid CILSS (2011): Paraquat ban [in French]. Decision No.125/COOR/2011. Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) | 18/9/2024 |
| Gambia | 2011 | National Environment Agency CILSS (2011): Paraquat ban [in French]. Decision No.125/COOR/2011. Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) | 18/9/2024 |
| Guinea-Bissau | 2011 | Ministry of Agriculture CILSS (2011): Paraquat ban [in French]. Decision No.125/COOR/2011. Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) | 18/9/2024 |

| Country | Banned | Source(s) | Date accessed |
|---------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Mali | 2011 | Ministry of Agriculture CILSS (2011): Paraquat ban [in French]. Decision No.125/COOR/2011. Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) | 18/9/2024 |
| Mauritania | 2011 | Ministry of Rural Development CILSS (2011): Paraquat ban [in French]. Decision No.125/COOR/2011. Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) | 18/9/2024 |
| Niger | 2011 | Ministry of Agriculture and Livestock CILSS (2011): Paraquat ban [in French]. Decision No.125/COOR/2011. Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) | 18/9/2024 |
| Palestine, State of | 2011 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 17/9/2024 |
| Senegal | 2011 | CILSS (2011): Paraquat ban [in French]. Decision No.125/COOR/2011. Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) | 18/9/2024 |
| Sri Lanka | 2012 | Gazette Extraordinary No. 1894/4 of 2014 (PDF) PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 18/9/2024 |
| Mozambique | 2014 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ UNEP/FAO/RC/CRC.18/INF/29 Paraquat: supporting documentation provided by Mozambique to the Rotterdam Convention. | 18/9/2024 |
| Oman | 2014 | Cooperation Council for the Arab States of the Gulf Secretariat (2015) General Pesticides Law (System) and its Implementing Regulation in the Gulf Cooperation. | 18/9/2024 |
| Turkey | 2014 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 18/9/2024 |
| Bahrain | 2015 | Cooperation Council for the Arab States of the Gulf Secretariat (2015) General Pesticides Law (System) and its Implementing Regulation in the Gulf Cooperation. | 17/9/2024 |
| Saudi Arabia | 2015 | Cooperation Council for the Arab States of the Gulf Secretariat (2015) General Pesticides Law (System) and its Implementing Regulation in the Gulf Cooperation. Saudi Food and Drug Authority Circular on Pesticides Ban | 18/9/2024 |

| Country | Banned | Source(s) | Date accessed |
|-----------------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Togo | 2015 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 18/9/2024 |
| United Arab Emirates | 2015 | Ministry of Climate Change and Environment Cooperation Council for the Arab States of the Gulf Secretariat (2015) General Pesticides Law (System) and its Implementing Regulation in the Gulf Cooperation. | 18/9/2024 |
| Qatar | 2015 | Cooperation Council for the Arab States of the Gulf Secretariat (2015) General Pesticides Law (System) and its Implementing Regulation in the Gulf Cooperation. | 18/9/2024 |
| Taiwan | 2018 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 18/9/2024 |
| Botswana n.b. both active chemicals^ | 2019 | Ministry of Agriculture Government of Botswana Your Botswana Guardian Sun | 18/9/2024 |
| Malawi | 2019 | Pesticide Act (2019) The Malawi Government Gazette. 56 (11). | 17/9/2024 |
| Vietnam | 2019 | Decision No. 278/QD-BNN-BVTV (In Vietnamese) PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 17/9/2024 |
| Brazil | 2020 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 17/9/2024 |
| China | 2020 | https://leap.unep.org/en/countries/cn/national-legislation/announcement-no-1745-ministry-agriculture-ministry-industry-and PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 18/9/2024 |
| Fiji | 2020 | LEGISLATION AND PESTICIDE CONTROL IN THE SOUTH PACIFIC (paclii.org) PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 18/9/2024 |
| Thailand | 2020 | Government of Thailand (2020) Ministry of Industry 2020. Notification B.E. 2563 (2020) re: List of Hazardous Substances (Issue No. 6) [in Thai]. The Royal Gazette 137(117). | 18/9/2024 |
| India n.b. both active chemicals^ | 2020 | Banning of Insecticides Order, 2020 | 17/9/2024 |
| Morocco | 2021 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 17/9/2024 |

| Country | Banned | Source(s) | Date accessed |
|----------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Maldives | 2022 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 17/9/2024 |
| Peru | 2022 | PAN (2024) Consolidated List of Banned Pesticides. Pesticide Action Network (PAN) International. Available at: https://pan-international.org/pan-international-consolidated-list-of-banned-pesticides/ | 17/9/2024 |
| Benin | ** | CILSS (2011): Paraquat ban [in French]. Decision No.125/COOR/2011. Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) | 18/9/2024 |
| Guinea | ** | CILSS (2011): Paraquat ban [in French]. Decision No.125/COOR/2011. Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) | 18/9/2024 |

^Denotes the labelled active ingredient on the ban is 'paraquat dimethyl sulphate (bis)' as opposed to 'paraquat'; paraquat dichloride' which is the listed active ingredient in the remainder.

** The global movement away from paraquat gained significant momentum in the 2010s, with several countries, particularly in Asia and Latin America, either banning or severely restricting its use. This growing trend in the 2010s was largely driven by heightened awareness of paraquat's toxicity and its links to health issues like Parkinson's disease, which helped fuel stricter regulations or outright bans in over 70 countries by the late 2010s.

A few key milestones include:

2011-2012: Countries like South Korea fully banned paraquat due to its association with poisoning and suicides.

2017-2020: Taiwan implemented a phased ban, with import and production halting in 2018 and full prohibition by 2020.

2019: Thailand and Vietnam also banned paraquat during this period, alongside increasing restrictions in other countries.

Parkinson's Australia requests that the APVMA responds to the documentation on each of those bans and presents what rationale specifically precludes them from your decision in this consultation period.

It is short-sighted to use the EPA's 2021 decision as its reasoning as a basis to keep this highly toxic, overwhelmingly banned and restricted chemical in use in Australia when over 70 countries have already made a stand with bans.

Impact on Australians

Paraquat exposure can indeed affect a wide range of individuals, particularly those involved in agricultural activities or living near areas where it is used. Including:

1. Farm/winery workers: Those directly involved in farming activities are at high risk due to frequent handling and application of Paraquat.
2. Herbicide and pesticide applicators: Individuals who mix, load, or apply Paraquat, especially using handheld or backpack sprayers, are at significant risk. e.g. school groundskeepers, weed control contractors, council workers, golf course workers, forestry staff, conservation maintenance workers.
3. Tractor operators: Applicators operating tractors equipped to spray herbicides or pesticides can be exposed during the spraying process.
4. Farm machinery repairers: People that work with the machines used to spray paraquat may get exposed when repairing or maintaining the equipment.
5. Agricultural pilots (crop dusters): Pilots who spray Paraquat from the air are also at risk due to potential inhalation and skin contact.
6. School children: Children attending rural schools near farms/wineries where paraquat is sprayed may be exposed through drift or overspray.
7. Property owners: Residents living close to farms or other areas using paraquat can be exposed through drift, overspray, or groundwater contamination.

PA members frequently report alarming rates of PD among farmers, a trend supported by anecdotal evidence from our case studies collected. The lack of comprehensive epidemiological data in Australia should not delay protective measures. The prevalence of PD in Australia is comparable to other industrialised nations, 1/173 (1)(¹⁰⁰). Current data suggests that countries with less intensive agriculture report much lower rates of PD, suggesting a link between agricultural practices and PD (7)(¹⁰⁰).

Moreover, there is Australian evidence from case-control studies that exposure to environmental toxins like paraquat more than double the risk for PD (27), that exposures in individuals with susceptible genetic backgrounds may be at even greater risk (28) and that the prevalence of PD may be higher than expected in regional and remote Australia, in areas that are often those with the highest use of agrochemicals like paraquat (1, 29).

Regulatory and safety concerns

Paraquat has been used in Australia since 1964 and is found in over 120 Australian products. We support the APVMA's proposed regulatory decisions reported in the [Special Gazette 30 July 2024](#) that use of paraquat in vineyards is not supported.

The toxicity and impact on human safety cannot be understated. The CDC states, "If you think you may have been exposed to liquid paraquat on your clothes or body, remove your clothing, rapidly wash your entire body with soap and water, and get medical care as quickly as possible..." and recommends disposing of the clothing, double bagged and waiting for someone from the health department or emergency services to take it away (18).

Given the substantial growing evidence linking paraquat to PD and the high toxicity, the precautionary principle should be applied. The precautionary principle advocates for preventive action in the face of uncertainty, and the APVMA should be prioritising public health over chemical use.

With the availability of safe alternatives, the continued use of Paraquat might be considered unethical and immoral.

Conclusion

According to world-leading neurologists, Bloem & Dorsey (2024), "*Parkinson's disease is the world's fastest growing brain disorder, and exposure to environmental toxicants is the principal reason*" (4). Paraquat is also on PAN International's Dirty Dozen (1985) and Highly Hazardous Pesticides (2009) lists for global phase-out (26, 30).

The APVMA must evaluate whether the continuing use of paraquat:

- would not be an undue hazard to the safety of people exposed to it during its handling or people using anything containing its residues
- would not be likely to have an effect that is harmful to human beings
- would not be likely to have an unintended effect that is harmful to animals, plants or things or to the environment
- would not unduly prejudice trade or commerce between Australia and places outside Australia
- would be effective in accordance with the instructions for its use.

The evidence is compelling and clear: paraquat poses a significant risk to public health and safety, the animals, plants, waterways and environment. It is very toxic to animals and humans, particularly those in the agricultural sector and rural areas.

Parkinson's Australia strongly recommends that the APVMA ban paraquat to protect the health and wellbeing of Australian farmers, rural communities and the surrounding

environment. This is backed up by over 10,000 signatures collected on the [Change.org petition to ban the use of paraquat in Australia](#) campaign that started on September 11, 2024.

The long-term benefits of such a ban far outweigh the short-term inconveniences, which can be overcome, as evidenced by the EU and 67 countries already having bans in place (Table 1, 31). There are many sustainable land practices that have become standard for Australian farmers (32). For example, according to the Snapshot of Australian Agriculture 2024 (33), many broadacre cropping farms already retain stubble (85% of farms), minimise tillage (68% of farms) and optimise the use of (and reduce reliance on) pesticides or fertiliser (65% of farms). This will be a legacy ensuring a healthier future for all Australians.

“These toxicants are not essential to a healthy life, a prospering economy, or a flourishing society. Clean food, water, and air are. The quicker we recognize the truth, the faster we take action, the sooner we will give our generation and generations to come a world largely free of PD.” Dorsey & Bloem 2024

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