

EXPERT REPORT

Paraquat Herbicide

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I. Qualifications/Professional Background

Education: Ph.D., Plant Pathology, University of Florida, 1992; M.S. Entomology, University of California, Riverside, 1988; B.S. Entomology, Michigan State University, 1984.

Career experience: My professional experience has encompassed almost all aspects of crop production and management in global agriculture. A year-long course on pesticide use during my undergraduate degree program in entomology intrigued and motivated me to pursue a career path in integrated pest management and international agriculture. The technology pursuit, controversy, large scale, and economic importance of crop pest management convinced me that this field was a good career choice for a curious and aspiring scientist.

After obtaining my undergraduate degree in entomology from Michigan State University (1984), I completed a two-year program as a Peace Corps volunteer in Honduras (1986), where I was assigned to a USAID-funded agricultural cooperative in the western province of Copan. I soon focused on creating training programs for small farmers on safe and effective pesticide use. During these two years, I became familiar with practices of local farmers in pest management, spraying equipment, pesticide (all types) labels, training manuals, small farmer application equipment such as backpack sprayers, and the challenges of local weed, insect, and disease pests affecting crop production in the region. I also focused on small farmer education where I had the opportunity to interact with agricultural researchers from universities in-country, international development professionals, and representatives from the agrichemical pesticide industry. Paraquat was a prominent agrichemical herbicide during my work with the Peace Corps in Honduras, and was used by most everybody in farming, and among non-farm property owners.

Upon completion of the Peace Corps program in Honduras, I was awarded a full scholarship as a research assistant in entomology at UC Riverside, leading to a M.S. degree, and from there I continued to the University of Florida, where I obtained a Ph.D. in plant pathology (1992) under a graduate research assistant scholarship.

After obtaining my doctorate at the University of Florida, I pursued an opportunity with ISK Biosciences, an American company with a business focus on the development and registration of agricultural products. In my role with ISK Biosciences, I moved to Honduras with my wife and two small children to run a company research farm focused on field efficacy evaluation of new herbicides, insecticides, fungicides, and other agrichemicals being developed by the company globally. My role soon expanded to include running the new product field development program for the company in Central America. The research and development (R&D) program covered a diverse group of crops including coffee, banana, sugarcane, vegetable, and fruit crops. Paraquat was a key and ubiquitous herbicide used by both small, subsistence farmers, and large growers and corporate farmers alike. Paraquat was used regularly on the research farm and I became intimately familiar with its characteristics and use patterns, product labels, competitor products, applicator training, safety and equipment (PPE).

In 1997, after five years at ISK Biosciences, I was hired by Dole Fresh Fruit Company to be their chief plant pathologist and plant disease program manager in banana with global responsibility in Latin America, the Caribbean, and Asia. As part of the technical team at Dole with an office at their San Jose, Costa Rica headquarters, my colleagues included the global environmental stewardship manager, pesticide regulatory experts, research scientists and other experts in agricultural production of pineapple and banana. I reported to the Vice President of Research and Development, the department that was responsible for all technical matters in crop production at Dole.

During my tenure at Dole, the company was extremely conscious of customer and public perception of pesticide use, and was particularly focused on environmental stewardship and best practices in agriculture. Worker safety, environmental stewardship, agricultural best practices, ISO 14000 certification (a set of international standards on environmental management), and similar subjects were of paramount concern to the company. Technical managers including myself were tasked with finding the best and safest alternatives in agricultural pest management and crop production, particularly anything that could successfully replace traditional, chemical pesticides. In approximately 1998, to the best of my memory, the company made a decision to reduce the use of Paraquat in its pineapple and banana production divisions across the world, due to perceived issues regarding worker safety, and pressures mounting from environmental and worker safety activists, a global awareness of acute and chronic toxicity issues with workers exposed to Paraquat, and other issues related to the use of this herbicide. Sweden banned the use of Paraquat in 1998, and international certification bodies like Rainforest Alliance, which Dole's competitor Chiquita Brands was using, were taking major steps to pressure the multinational fruit companies to eliminate the use of Paraquat. Dole began a transition process to remove Paraquat from their banana divisions. Research on Paraquat alternatives was accelerated, and Dole put in place formal objectives for the gradual implementation of weed management programs that did not include Paraquat. This research took place through the individual research departments in Ecuador, Colombia, Honduras, Costa

Rica, and the Philippines. Additionally, independent growers contracted to sell their fruit to Dole were persuaded to follow suit. In comparison, Dole's pineapple divisions took longer to find a replacement for Paraquat in the burndown technique of harvested pineapple fields. This delayed removing Paraquat entirely until Dole finally ceased to use Paraquat on a company-wide, global basis in 2008. Post-harvest burndown of pineapple fields was used to accelerate the degradation and incorporation into the soil of the voluminous and fibrous plant tissue as part of the process replanting the next pineapple crop.

Dole was able to continue high levels of crop yield and profitability in banana without the use of Paraquat. In its place, Dole used alternative herbicides such as Diquat and glyphosate, and combined this with manual weed control with motorized "weed eater" brigades. It's important to keep in mind that weed pressure in the warm and humid tropics is extreme, much more than temperate regions. Thus, the challenge was fierce (and still is) to balance good crop yields and high quality, exported fruit with low pest pressure, environmentally sound pesticide use, worker safety, customer compliance, consumer acceptance, and economics.

As the list of countries banning Paraquat has risen dramatically across the globe since Sweden's decision in 1998, banana and pineapple production have continued unimpeded. In fact, pineapple acreage has continued to expand rapidly since I left Dole in 2005, due to the customer preference and consumer demand of the newer, sweeter pineapple varieties. Post-harvest burn-down of pineapple fields has been replaced by mechanical shredding and to a limited degree, the use of herbicides such as fluroxypyr + metsulfuron-methyl.

During my career, I have been active in the Spray Drift Task Force, an agricultural consortia of agrichemical companies and large, global agricultural producers. This task force was established during the first FIFRA re-registration wave that took place in the mid to late 1990's. Their chief goals included updating spray drift prediction models through field research, defining best practices in spraying operations, spray drift minimization, and incorporating and standardizing spray drift mitigation measures and language in pesticide labelling. In this role, I was involved in aerial spraying drift measurement, spray drift prediction models, and assisted in the creation of corporate policies regarding all agrichemical spray operations and technical protocols for Dole production divisions across the globe.

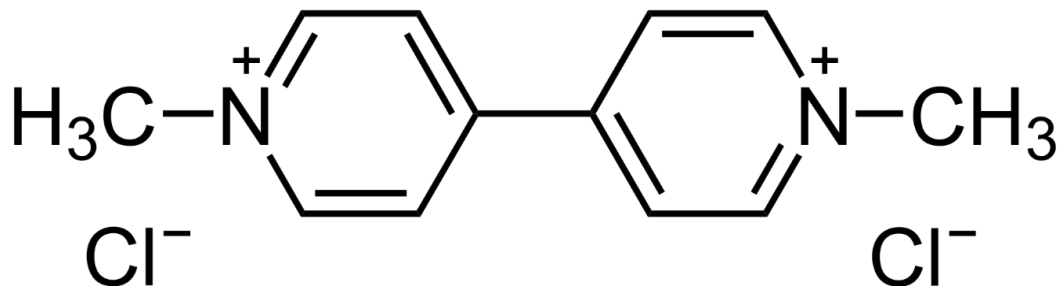
I left Dole in 2005 and remained in Costa Rica for an additional seven years where I had a contract research company and global agricultural consulting business, which provided further experience in all aspects of agricultural production on many crops including weed management and herbicide use. I formed a startup company, Abatex, together with a corporate client in Germany who were looking to establish a new source of a specialty fiber, called Manila hemp, which is harvested from a non-edible, banana species. I supervised the creation of 700 acres of this crop, and developed the agronomic program, including weed management, for all the associated growers. Additionally, I managed my own farms on leased land.

In 2006, I began my work as a legal expert witness on crop damage cases, disease-damaged produce, international logistics of agricultural produce, spray drift, and a diversity of other subjects in agricultural production. I continue legal expert witness work to this day, and my record speaks for my objectivity, fairness, and expert knowledge in agricultural chemical use, pest management, and extensive knowledge in many aspects of crop production.

I returned to the U.S. in 2012 and have been employed as an agricultural research and development manager (R&D) in private industry. My job responsibilities include executing agricultural research projects all over the world including the U.S., which has furthered my experience in many aspects of agriculture, including hands-on management of a research farm in Georgia, interactions with many growers facing agriculture's modern challenges, supervision of agricultural laborers, execution of pesticide applications, pesticide regulatory training, and diverse interactions with industry trade groups, university and private research scientists, and agriculture regulatory bodies.

My educational and professional experience has provided me with knowledge and familiarity with the application of herbicides and other pesticides under diverse scenarios ranging from small back-pack sprayers to tractor-mounted sprayers, to large scale, aerial applications. I am an expert on crop spraying operations, spray drift modeling, spray equipment calibration, spray technology, agricultural operations, crop pest management including all categories of crop pests and weeds, crop fertility, pesticide labelling, agrichemical use patterns and programs, worker safety practices, corporate agrichemical product stewardship programs, environmental stewardship programs, and particularly relevant to this case; real-world use patterns and practices of herbicides and their alternatives, including Paraquat.

II. Paraquat



a. General information about Paraquat as an herbicide.

Paraquat is a broad spectrum, contact herbicide that was first manufactured and sold by Imperial Chemical Industries (ICI) in 1962 under the trade name Gramoxone. In the U.S, Paraquat is still on the market today and its use continues to increase despite increased regulatory pressure and constricting regulations imposed on end users. Syngenta has stated publicly its commitment to defending this herbicide sales and marketing where legally registered.

The European Union vacated the registration of Paraquat in 2007 due to human toxicity concerns including reported associations with Parkinson's disease and unacceptable operator exposure levels. Brazil banned the use of Paraquat in 2017 after determining that Paraquat is mutagenic and causes Parkinson's disease. Many other countries including China, Chile, and Malaysia have also banned its use due to human health concerns. Currently, Paraquat is either banned or unavailable for sale in 144 countries (Syngenta Response to Interrogatories 2/19/24). International certification bodies such as the Rainforest Alliance have called for a global prohibition of Paraquat (2023). The World Health Organization (WHO) published a technical brief on Parkinson's Disease in 2022 and recommended that Paraquat be banned for use globally.

In the United States, Paraquat was first registered as a pesticide in 1964. The EPA required a reregistration of all pesticides and Paraquat's reregistration was completed in 1997. All paraquat products in the U.S. are classified as Restricted Use Pesticides. This means that end users must complete EPA -certified training and update this training on a regular basis.

b. Benefits of Paraquat use

Paraquat was one of the earliest broad-spectrum herbicides available in the United States. It kills a wide variety of grass and broadleaf weeds and was marketed across the globe as one of the best herbicide options to efficiently achieve fast-acting and effective weed control. Paraquat has been viewed historically as having several benefits such quick response in weeds, being largely inactive after contact with soil, and non-systemic activity which limits damage on unintended plants and crops. It has been considered to be a tool for killing glyphosate-resistant weeds. Paraquat historically offered lower prices than glyphosate until approximately 1990.

c. Risks of Paraquat use

Paraquat is a highly toxic substance. For comparison, it is roughly 30 times more acutely toxic than glyphosate. The lethal dose for acute toxicity of Paraquat is near 30 mg/kg of body weight. This translates to rough 1-2 teaspoons of a 30% formulated mixture of the active ingredient, paraquat dichloride. Contact with the herbicide, including direct contact with the concentrated

product during dispensing and mixing operations as well as contact during spraying operations and cleanup must be avoided in order to safeguard human health. Paraquat is in Toxicological Category I due to its severe and fatal toxicity if ingested near or above the threshold dose, and can be severely incapacitating even if not fatal.

Paraquat's fame and history as a rapid inducer of human suicide is well documented and well known. Through my work experience during the 1990's and 2000's, I became personally familiar with several cases of suicide from Paraquat ingestion.

Paraquat is also known to cause severe skin irritation when there is dermal contact with either the concentrated product or the spray mixture in some individuals. I have personally witnessed severe burning of the skin in farm workers after spraying labeled rates of Paraquat to kill weeds.

Peer reviewed literature has supported an association with Paraquat and Parkinson's Disease. A meta-analysis by Tangamornsuksan et al., 2019, found a statistically significant association (OR of 1.64 (95%CI 1.27 -2.13)). Another earlier meta-analysis report published by Pezzoli et al., 2013, also found a statistically significant association (2.19 (95%CI 1.48–3.26)). Further, countries such as Brazil have concluded that Paraquat presents a neurotoxic risk.

Personal Protective Equipment (PPE) recommendations on the Paraquat label have changed throughout the years. The purpose of the use instructions on the product label prioritizes the avoidance of worker exposure to Paraquat. These instructions are necessary and required by the product label. However, in practice the labeling instructions are difficult to follow and often impractical for many reasons (Garrigou, 2020). These reasons include some or a combination of factors such as worker complacency, PPE discomfort in excessive heat conditions, lack of worker training and certification of actual end users (delegating mixing and spraying to non-certified and untrained individuals), accidents, human error, lack of worker supervision, and time constraints. In my opinion, even with the best training, worker competency, effort, supervision and enforcement, workers will be inevitably exposed to Paraquat. The dose, frequency, and severity of this worker exposure to Paraquat will depend on the specific circumstances of how Paraquat was inhaled or dermally absorbed.

Knowing the toxicity concerns of Paraquat and that there exist suitable and safer alternatives available and the reality of what I just described, it is my professional opinion that the product should no longer be marketed and sold in the United States. The EU and many countries made the decision to discontinue Paraquat's use, Dole Fresh Fruit made this decision, many environmental certification bodies, health authorities, and agricultural production corporations have made this decision.

Based on Acute Risk alone, the EPA has recently recognized that the labeling requirements for

Paraquat prior to 2016 were insufficient to mitigate risk to farmers.

Furthermore, it is my professional opinion that agricultural workers and the public at large deserve and need to be assured that they are not being exposed to chemicals that pose a high risk of acute or chronic toxicity or contributing to the onset of disease.

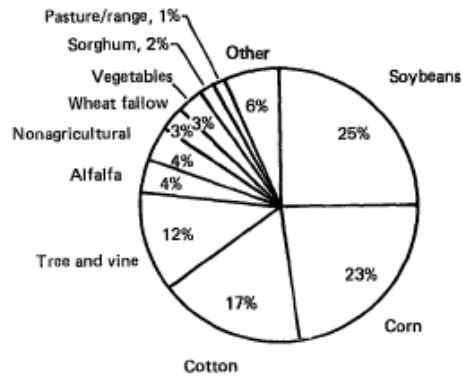
III. Alternatives to Paraquat

Chevron and ICI, the predecessor to Syngenta, undertook numerous studies to evaluate the opinions of applicators, distributors, researchers, and other recognized authorities on Paraquat versus alternatives. An exploratory study conducted on behalf of Chevron and ICI in 1976 aimed to evaluate the attitudes of various groups on the use of Paraquat, through conducting detailed interviews. At the time, Roundup (glyphosate) was not yet viewed as a competitive threat due to its higher cost and the fact that because it was recently introduced to the market there remained questions as to its usefulness and effectiveness. Those interviewed, however, were impressed with glyphosate's usefulness and effectiveness and there was a recognition that if it was priced competitively, it would be a suitable alternative. The major benefit of Paraquat identified in the study was that it was the most economical herbicide and worked faster than glyphosate. Paraquat was seen as more dangerous and there was a recognition that other chemicals, including Atrazine and pre-emergent herbicides can be substituted for Paraquat. Additionally, there was anticipation that cheaper, less toxic, and equally effective pesticides, including glyphosate, would soon be available. The report is filled with statements recognizing that Roundup was more effective because it kills roots and a broader variety of weeds and the only barrier was price.

In 1986, Chevron and ICI conducted another study evaluating the position of Paraquat in the herbicide business. The report notes that Paraquat's share of the herbicide market was low and declining due, primarily, to competition in the no-till market. The report found that "in addition to issues of efficacy, it also seems that paraquat may be losing some sales to Roundup due to cost, despite the fact that generally Roundup is more expensive." This was due, in part, to Roundup's superior efficacy. Significantly, the report noted that "where toxicity is a perceived issue, between two products of equal efficacy, a grower would often be willing to pay somewhat more for a product he perceives as safer." As noted in the report, in 1984 Paraquat was used most extensively in corn, soybeans, and cotton:

PARAQUAT USE — 1984

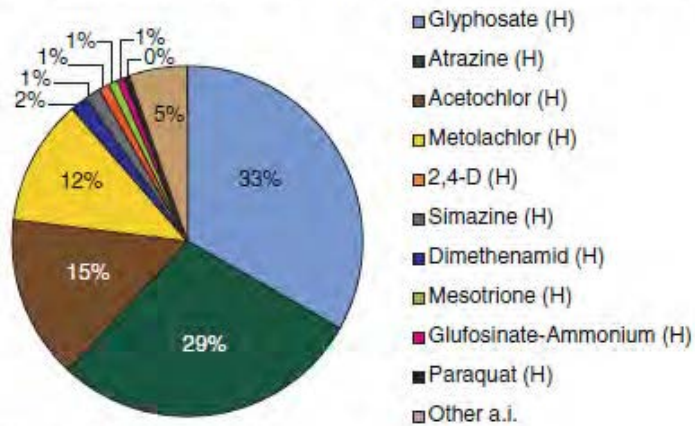
PARAQUAT USE BY CROP
Percent of gallons*



I have reviewed the US Department of Agriculture's 2014 publication that historically summarizes the use of pesticides in the United States from 1960-2008. By 2008, the amount of Paraquat use in corn and soybeans compared to alternatives was almost non-existent:

Appendix figure 4.7

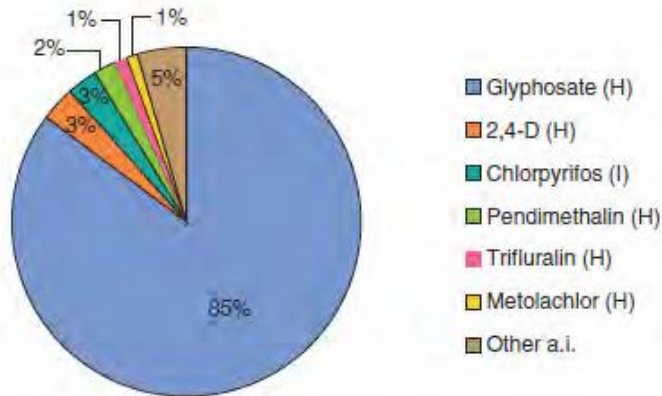
Pesticide use by active ingredient (a.i.) on corn in 2008, percent of total pounds a.i. applied¹



¹This graph shows the top pesticide a.i. used in corn in 2008.

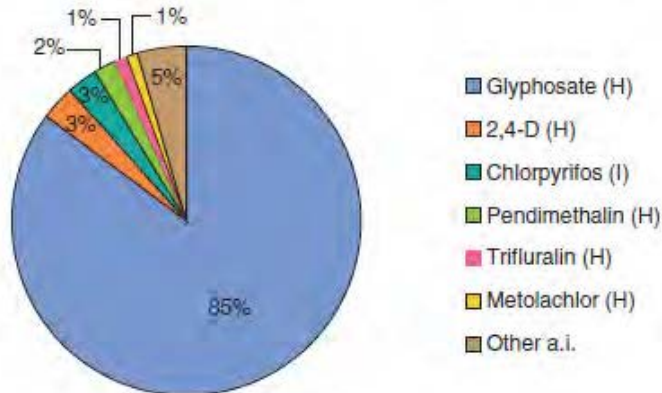
Sources: Economic Research Service with USDA and proprietary data. See Appendix 2.

Appendix figure 4.9
Pesticide use by active ingredient (a.i.) on soybeans in 2008, percent of total pounds a.i. applied¹



¹This graph shows the top pesticide a.i. used in soybeans in 2008.
 Sources: Economic Research Service with USDA and proprietary data. See Appendix 2.

Appendix figure 4.9
Pesticide use by active ingredient (a.i.) on soybeans in 2008, percent of total pounds a.i. applied¹



¹This graph shows the top pesticide a.i. used in soybeans in 2008.
 Sources: Economic Research Service with USDA and proprietary data. See Appendix 2.

These figures confirm that farmers and other applicators in the United States have effective and safer alternatives than Paraquat. The retail price levels of the safer herbicide alternatives to Paraquat are competitively priced on a cost per acre as well as per gallon basis. For example, the latest pricing from an unnamed agricultural pesticide retailer in south Georgia is \$ 37.50 per

gallon for Paraquat, compared to \$ 60.00 per gallon for Diquat, \$ 18.50 per gallon for glyphosate (Round-Up). In the Tucson, AZ area, a retailer has a price of \$ 70 per gallon for Diquat compared to \$ 40 per gallon for Paraquat herbicide formulation. Note that glyphosate is more economical than either of these herbicides, longer lasting, with systemic uptake in plants, and widely used. During the 1970s and 1980s, Paraquat was cheaper than Roundup. Regardless, it is my opinion that even if Paraquat offered a cheaper alternative, its risks outweighed the benefits and the safer alternative pesticides were not cost prohibitive.

Across the U.S. herbicide market, formulations with the active ingredients Glyphosate and Diquat are the two most common, broad-spectrum herbicides utilized. They are documented to be safer than Paraquat, and they compete economically with Paraquat. Roundup is approximately 30 times less toxic than Paraquat. Diquat is less acutely toxic than Paraquat. Both Roundup and Diquat have not been linked to associations with Parkinson's disease. Large corporations, international certification bodies, government regulators, pesticide distributors, retailers, crop trade associations, as well as individual growers have accepted and implemented these herbicides as alternatives to Paraquat on a massive scale.

Arguments are often made that long-term use of glyphosate is not sustainable due to glyphosate-resistant weeds. In my opinion, these arguments are largely overstated. Most frequently, applicators are not incorporating the best technical recommendations for the product, such as appropriate adjuvants and maintaining a low pH in the tank mixture. Tank-mixing with other herbicides that are effective and labeled against the purportedly glyphosate-resistant weeds can effectively eliminate any issues with glyphosate-resistant weeds. Additionally, follow-up sprays and spot-spraying to clean up problem weeds or surviving in the treated area are commonly used and are extremely effective tools.

In addition to the broad-spectrum herbicides mentioned, there are many more specialized and weed category-specific herbicides that are on the market. Most of these herbicides have much lower, labeled use rates, and all of them are safer to humans based on toxicological profiles and label categories. In tank mixtures and combinations with other herbicides, effective control of a broad range of weeds can be readily achieved. These herbicides include such active ingredients as metribuzin (1973), mesotrione (1999), glufosinate ammonium (1972), 2,4-D (1946), sethoxydim (1988), clethodim (1990), dicamba (1967), diuron (1966), and herbicides belonging to the sulfonyleurea group of chemistry (late 1990's). There is an abundance of information made available to farmers and herbicide applicators on these herbicides, their use patterns, advantages and disadvantages, and specific recommendations on their use, and of course product labels. University extension services exist in each state, and there are weed scientists in all these institutions who regularly update formal recommendations, and actively update field research in the different crops and production systems. Agricultural suppliers and pesticide distributors and dealers have ample information at their fingertips which is widely shared

among the customer base and agricultural industry. Furthermore, the representatives, manufacturers, and authorized dealers regularly attend agricultural trade shows in each crop industry and promote their Paraquat alternative herbicides and technologies as well as providing detailed product information. It is important to state the obvious for context; The vendors of Paraquat, who are competing directly with these alternatives, have aggressively promoted the use of Paraquat and related products containing the same active ingredient, and in fact have maintained sales growth despite the increased regulation, public scrutiny, customer demands, and regulatory pressures and oversight.

All of these chemical herbicide alternatives to Paraquat have clearly documented and labeled acute toxicity levels which are much lower than Paraquat, and have correspondingly lower risk levels to worker safety.

In a 2016 analysis, the EPA analyzed the incidence for high and moderate severity poisonings for Paraquat, glufosinate, and glyphosate concluding:

The incident rate (on a usage-normalized basis) for high and moderate severity poisonings associated with paraquat use was significantly and substantially higher than that of two potentially comparable herbicides, glufosinate and glyphosate. More specifically, the incident rate associated with paraquat when considering high and moderate severity poisoning outcomes (after normalizing by amount a.i. used) was estimated to be about 10 times that of glufosinate and 23 times that of glyphosate. Diquat data was not part of this analysis because there were no high or moderate severity incidents. (Nguyen 2016).

In response to this data, the EPA initiated steps to mitigate the risks of Paraquat by implementing strict labelling changes that would ideally reduce Paraquat exposure to applicators including the following:

- Changes to the pesticide label and distribution of supplemental warning materials to highlight the toxicity and risks associated with paraquat products.
- Restricting the use of paraquat to certified pesticide applicators only. Individuals working under the supervision of a certified applicator are prohibited from using paraquat.
- Specialized training for certified applicators who use paraquat to emphasize that the chemical should not be transferred to or stored in improper containers.
- New closed-system packaging designed to prevent transfer or removal of the pesticide except directly into proper application equipment. This will prevent spills, mixing or pouring the pesticide into other containers or other actions that could lead to paraquat exposure.
- Limit aerial applications to a maximum of 350 acres per applicator per 24-hr period for all uses except cotton desiccation.

- Require a residential area drift buffer for all aerial applications;
- Prohibit use of human flaggers;
- Prohibit pressurized handgun and backpack sprayer application methods;
- Limit the maximum application rate for alfalfa to one pound of paraquat cation per acre;
- Require enclosed cabs if area treated in 24-hour period is more than 80 acres;
- Require enclosed cabs or PF10 respirators if area treated in 24-hour period is 80 acres or Less
- Require a 7-day restricted entry interval (REI) for cotton desiccation;
- Require a 48-hour REI for all crops and uses except cotton desiccation; and
- Require mandatory spray drift management label language.

It must be mentioned that there are alternatives to chemical herbicides as well. These include the use of cover crops, mechanical control methods such as mowing, discing, raking, weed-eaters, and the like. All these practices are frequently used to complement chemical herbicide use, and in some cases, such as organic farming, completely replace herbicides. It can be argued that these other methods are more costly, less convenient, less efficient than chemical weed control including Paraquat. However, there are proven cases of non-herbicidal weed management used on a wide scale.

My opinion that there are safer alternatives that can effectively manage weeds is supported by not only my extensive personal and professional experience but also scientific studies published in refereed scientific journals, articles in trade publications, extension researcher articles that document clearly that there is no yield reduction or significant economic disadvantage to using herbicide alternatives to Paraquat, and which document equivalent or superior weed control.

A paper by Stuart et al (2023) published in Environmental Science and Pollution Research, investigated the uses of paraquat, the effects of national paraquat bans on agricultural production, alternative weed management approaches to replace paraquat, and case studies of successful alternative approaches to paraquat. Their review included consultation with regulators, retailers and agricultural organizations in the countries where paraquat is no longer able to be legally sold. The authors found no evidence across any of the countries assessed to suggest that a ban on paraquat had negative effects on crop yields at a national or state level.

The findings in Stuart (2023) are consistent with other published studies looking at whether national pesticide bans adversely affect agricultural yields. Wibawa, et al. (2007) showed that glufosinate and glyphosate were effective alternatives to paraquat to control weeds in immature oil palm in Malaysia.

Similarly, Kim et. al (2019) showed that productivity was not lost following Korea's ban on Paraquat. They found that Paraquat was effectively replaced by glyphosate and glufosinate.

They further document that the total national suicide rate in Korea decreased by 10% following the Paraquat ban. Accordingly, I conclude that the loss of productivity in banning Paraquat is at most nominal in light of the potential alternatives.

In my expert opinion, there are effective, proven, economical, and safer herbicide alternatives to Paraquat available in the U.S. Additionally, non-chemical methods which complement and even replace chemical herbicides have been documented and are being utilized on a large scale. As an experienced agronomist and agricultural scientist and as a person with personal experience applying herbicides to manage weeds on agricultural property, it is my opinion that practical, effective, economic alternatives to Paraquat can effectively be used for any circumstance and weed target without negatively affecting crop yields or agricultural business. I will point to my experience again at Dole, where, by the year 2008, the company definitively and effectively replaced Paraquat without any economic or crop health detriment, under continuing and severe weed pressure in their entire production area across the globe.

IV. A) Consumer Expectation Test

I have considered various factors that go into what a consumer expects including the label language and presentation, an implied trust of federal and state regulation, education and training, safety to the environment, and expectations concerning human and environmental safety. I also have considered the expectations from advertising, sales promotion, and sales activity of the company marketing the product.

The consumer can be defined to include; 1) The grower, which can be an individual, a group of individuals, or a company. 2) People who have direct contact with the liquid Paraquat which are mixers, loaders, and sprayers. This may be the same as the grower, as many growers mix, load, and spray their own pesticides; 3) People who will be in the immediate vicinity of the spray application area and who could be exposed to aerial drift, volatiles, and wet product on the ground and foliage ; 4) Owners and management of the agricultural property, employers, large companies, etc. who purchase the product Paraquat. These categories represent the intended users manufacturers could reasonably anticipate for Paraquat.

Paraquat's intended use is to kill weeds where applied. This report has explained the nature of the product, its use patterns, advantages, disadvantages, its toxicity both acute and chronic.

An ordinary consumer would not have been aware of the chronic health risks of Paraquat and certainly not any link with Parkinson's disease.

B) Risk-Utility Test

I have read and reviewed many documents (see **Referenced Documents**) related to Paraquat including its risks and benefits and the risks and benefits of potential alternatives. I rely on my own agriculture experience as well as numerous publications and studies. I have reviewed Paraquat product labels, toxicology information, scientific papers reviewing and reporting on links to Parkinson's disease, articles detailing herbicide alternatives to Paraquat and non-herbicide weed management practices, reports from international organizations including the FAO and WHO, documents from foreign country regulatory authorities, and documents from the US EPA specific to Paraquat. I have summarized this information in this report and presented what I think is a fair assessment of this technical subject.

It is my opinion that the risks that Paraquat poses and posed to human health from both acute and chronic toxicity and the failure of PPE and general practices in the U.S. agriculture industry to protect against those risks makes it imperative to completely discontinue the use of Paraquat. It is also my opinion that the alternatives to Paraquat for weed control are many, proven, safer, economical, and effective. Disadvantages can and are overcome with current knowledge, products, and techniques.

Accordingly it is my opinion, to a reasonable degree of scientific certainty, that an ordinary user of Paraquat would not expect it to cause Parkinson's disease or other chronic health issues; and that the possibility and seriousness of harm of Paraquat outweighed the burden or cost of using alternative pest control methods. I hold this opinion from the outset of Paraquat's entry to the US market in 1965 to today.

V. Summary statements

It is my professional opinion, after reviewing a substantial amount of documentation and literature references on this topic, and taking into consideration my ample and long-term experience with Paraquat, herbicide alternatives, weed management, and herbicide spraying, that safer and effective alternatives to Paraquat exist.

I reserve the right to add to, modify, and otherwise edit this opinion based on new information obtained or provided.

A handwritten signature in blue ink, appearing to read "John R. Washington".

John R. Washington, Ph.D.

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