

January 11, 2021

Docket ID: **EPA-HQ-OPP-2011-0855**

OPP Docket

Environmental Protection Agency Docket Center (EPA/DC), (28221T)  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460-0001

Subject: **“Pesticide Registration Review: Proposed Interim Decision for Paraquat”**

The Weed Science Society of America (WSSA) is a non-profit professional society promoting research, education, and awareness of weeds in managed and natural ecosystems. Our members include academic, governmental, and private industry research scientists, students and teachers, extension educators, and federal, state, county, and private land managers. We welcome the opportunity to comment on the value and uniqueness of paraquat for weed management.

**Paraquat’s Combination of Characteristics is Not Found in Any Other Alternative Herbicide**

Paraquat is a fast-acting, non-selective, broad spectrum, contact herbicide. It is one of only two herbicides that are classified as photosystem I electron diverters (WSSA Group 22). The other is diquat, which is primarily used as an aquatic herbicide. As of 2020, there are only six weed species in the United States with resistance to paraquat:

- 1) American black nightshade (*Solanum americanum*)
- 2) Dotted duckweed (*Landoltia punctata*)
- 3) Indian goosegrass (*Eleusine indica*)
- 4) Hairy fleabane (*Conyza bonariensis*)
- 5) Horseweed (*Conyza canadensis*)
- 6) Italian ryegrass (*Lolium perenne* ssp. *multiflorum*)

Photosystem I electron diverter herbicides accept electrons from photosystem I that leads to a self-perpetuating chain reaction of lipid oxidation that destroys the integrity of cell membranes, allowing cytoplasm to leak into intercellular spaces which leads to rapid leaf wilting and desiccation. For paraquat, rapid leaf wilting and desiccation begins within several hours of application in full sunlight and complete foliar necrosis occurs within 1-3 days. When applied with a non-ionic surfactant, paraquat is rapidly absorbed

into foliage and is rainfast within 15-30 minutes. In addition, paraquat is rapidly and tightly adsorbed to soil and there is no leaching potential. All rotational crops may be planted immediately after an application of paraquat (i.e., 0 day crop rotational interval).

There are three main herbicides used for broad-spectrum burndown treatments prior to planting and in fallow and non-cropland areas: paraquat (WSSA Group 22), glyphosate (WSSA Group 9) and glufosinate (WSSA Group 10). Having the option for three different mechanisms of action (MOA) is important for weed resistance management. Herbicide mixtures utilizing two or more different MOA's applied at the same time are more effective at preventing weed resistance than a rotation of herbicide MOA's where only one MOA is applied at a time.

Besides paraquat's wide scale use as a weed burndown treatment prior to planting and in fallow, its unique combination of herbicidal characteristics (i.e., non-translocated, very fast acting, no leaching potential) make it an important vegetation management tool for the following uses:

- dormant season in established alfalfa, clover, mint, and rhubarb
- between cuttings in established alfalfa
- pre-harvest in drybeans, sunflowers, guar, potatoes, and soybeans
- post-directed in corn, sorghum, soybeans, sugarcane, pineapple, small fruits, cassavas, taniens, yams, pigeon peas, strawberries, trees and vines, guava, hops, tomatoes, and peppers
- pre-harvest desiccation of potatoes, cotton and weed control in rubber and coffee plantations
- control of existing vegetation prior to planting corn, cotton, and soybean without tillage

### **Paraquat as a Restricted Use Pesticide**

The value of paraquat as a weed management tool has to be balanced with the fact that it has high acute toxicity to mammals. As such, paraquat is a Restricted Use Pesticide (RUP) that can only be purchased by certified applicators and applied by individuals under direct supervision of that certified applicator. In addition, there are no paraquat products registered for homeowner use and no products registered for application to residential areas. Paraquat labels specifically forbid this and all have this statement: DO NOT use around home gardens, schools, recreational parks, golf courses or playgrounds.

There have been multiple regulatory measures since the late 1980s to reduce the occurrence of accidental and intentional ingestion of paraquat, including labeling and the incorporation of dyes, stenching agents, emetics, and gelling agents in the formulation. However, there have been a number of incidents since 2000 where people have died due to accidental ingestion of paraquat. These cases have resulted from paraquat being **illegally transferred** to beverage containers and later mistaken for a drink and consumed.

### **Comments on the Paraquat Proposed Interim Decision (PID):**

Given the value of paraquat as a unique weed management tool and the updated human health mitigation measures, **WSSA is opposed** to the following two application restrictions proposed by EPA:

- prohibition of all aerial applications of paraquat except for cotton desiccation
- prohibition of all paraquat applications using mechanically pressurized handguns and backpack sprayers.

**WSSA disagrees with EPA's proposal to eliminate all aerial uses of paraquat except for cotton desiccation.** Paraquat has been applied by air safely and professionally for decades, as documented by EPA's incident database. Eliminating aerial applications of paraquat would likely cause undue harm to soybean, sunflower, potato, rice, wheat, alfalfa, corn, and dry bean growers across the country. EPA estimated that paraquat is only aerial applied on 3% of paraquat treated acres, but this estimate seems low. Data from the California Department of Pesticide Regulation's Pesticide Use Reports (PUR) database shows that from 2015 to 2019, an average of 16% of all paraquat treated acres in California were applied aerially. Specifically, in **California, aerial applications of paraquat accounted for:**

- 90% of safflower acres
- 76% of dry bean acres
- 51% of corn for human consumption acres
- 27% of onion acres
- 76% of rice acres
- 63% of sorghum/milo acres
- 25% of tomatoes for processing acres
- 36% of wheat acres
- 9% of alfalfa acres

California leads all states in the production of tomatoes for processing, safflower, corn for human consumption, dried lima beans, and alfalfa, so prohibiting aerial applications of paraquat in these crops will likely have adverse economic impacts on both growers and consumers throughout the U.S.

Aerial applications of paraquat are commonplace in California's Northern San Joaquin Valley, Sacramento Valley and Intermountain region, among others. Paraquat is aerially applied with other residual herbicides during the rainy season when soils are wet. This is important because wet soils limit the ability to access the fields with ground equipment. **The only way to treat these fields is by air.** The timing of these applications is essential, as the application must be done before the weeds reach a large growth stage for the products to be effective. Waiting for the soil to dry out is often not an option and applications can fail if they are delayed because of weed size.

In addition, paraquat is distinct from other herbicides in that it is rainfast very quickly. This makes it a highly flexible tool in weed management systems where weed control is needed during frequent rains such as for alfalfa in the winter months of California's rainy season or in soybeans during the hurricane season in the southern U.S.

**WSSA also disagrees with EPA's proposal to prohibit the use of mechanically pressurized handguns and backpack sprayers to apply paraquat.** EPA estimates this type of paraquat application to be less than 2% of all applications. WSSA's opposition to this item in the proposed interim decision is based on the critical role that manually operated small scale paraquat application plays in agronomic research, spot treatments to combat grain contamination, and non-agricultural settings.

Numerous uses of paraquat in orchards, vineyards, and around infrastructure depend on backpack sprayers and other small scale hand-held equipment. For vining crops such as grapes, paraquat is used for control of annual weeds once grapes are actively growing. Paraquat is also important for sucker control, such as in coffee, because it is not translocated. Paraquat can also be applied in tree fruit crops for control of weeds beneath the trees; there are few other options during the active growth cycle for trees. In railroad yards, paraquat can be used for quick knockdown of fast-growing wheat that drops from railcars. It is important in these types of environments to not allow weed growth, as fires can start from sparks underneath railcars. In other non-crop areas, paraquat can be used on pavement cracks with little concern for movement off-site or leaching following rainfall compared to other herbicides. Spot treatment around grain bins and rights-of-way is similarly important.

In addition, WSSA would like to underscore the importance of backpack and handheld sprayers in small plot-based research settings. Regardless of restriction on field application by growers, it is imperative that researchers have access to manual application of paraquat to continue to advance knowledge and techniques in managing weeds, combatting herbicide resistance, and conducting burndown activities. WSSA's greatest concern is that prohibiting paraquat applications from handheld equipment would essentially eliminate the weed science community's ability to do small plot research with paraquat. Many of the research discoveries that result in practices integrated into use by the farming community begin with small plot research.

Finally, **the importance of paraquat for managing herbicide resistant weed populations cannot be overstated.** While there have been some limited instances of weed resistance to paraquat, this is a low rate of resistance development over time compared to other herbicides that have been used as widely. Being able to apply paraquat both aerially and with backpack sprayers will be important to help delay and manage other resistant weed populations.

The WSSA appreciates the opportunity to provide comment on the value and uniqueness of paraquat for weed management. We strongly support further education and awareness activities both on the label and through training. However, we do have

concerns about the application restriction measures proposed. They would eliminate many unique weed management options and put undue pressure on other broad-spectrum burndown treatments. The WSSA looks forward to working with the Agency on this important topic.

Sincerely,

A handwritten signature in black ink, appearing to read "William Curran", with a long horizontal flourish extending to the right.

Dr. William Curran  
President  
Weed Science Society of America