Comments on Reconsideration of Issues from EPA's Interim Registration Review Decision for Paraquat

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To Whom It May Concern:

We submit these comments on behalf of agricultural stakeholders in response to "EPA's Preliminary Supplemental Consideration of Certain Issues in Support of its Interim Registration Review for Paraquat." At this time, we wish to update EPA on paraquat use patterns on Arizona cotton and other crops and to respond to specific issues and questions posed by EPA in relation to potential human health risks. Our comments are limited to the use of paraquat in Arizona.

For the record, we wish to integrate by reference comments previously submitted to EPA in response to Draft Risk Assessments for paraquat, Document ID EPA-HQ-OPP-2011-0855-0203: Fournier A.J., W. McCloskey, P.C. Ellsworth, A. Mostafa, W.A. Dixon II. 2019. Paraquat Dichloride Use and Benefits in Arizona Agriculture. University of Arizona, Arizona Pest Management Center. 12/16/19.
https://www.regulations.gov/comment/EPA-HQ-OPP-2011-0855-0203

We also reviewed and support comments submitted by Arizona Farm Bureau Federation in response to the current comment period.

Paraquat Use Pattern in Arizona

Paraquat is a fast-acting, non-selective herbicide used for the control of broadleaves and grasses in agricultural and non-agricultural use sites. It also functions as a plant growth regulator (PGR), most commonly as a desiccant and harvest aid in cotton and certain other crops. Based on the information from the Arizona Pest Management Center pesticide use database (Fournier et al. 2017), the most significant uses of paraquat in Arizona are in cotton as a harvest aid and on fallow land for pre-plant weed control for a variety of crops. As a harvest aid in cotton, paraquat is applied as a desiccant prior to harvest, following application of Ginstar (diuron+thidiazuron) or a similar defoliant. Paraquat mixtures with other defoliation time sprays are also popular. These mixtures performed very well in a 2023 defoliation trial (Norton and Ellsworth, unpublished data). We also see significant reported use in lettuces, pecans, alfalfa grown for seed and dry beans. Apart from cotton, of the uses listed by EPA among scenarios with potential remaining risks for high acreage and low acreage ground applications, lettuce is the only crop with a significant level of reported uses of paraquat. Our previous comments (Fournier et al. 2019) provided information on the importance of paraquat use for alfalfa seed production, and in pecans and pistachios.

Declining Use in Cotton Defoliation

Since the submission of our comments in December 2019, where we estimated paraquat use as a desiccant to aid in cotton defoliation at 15% to 20% of the statewide cotton acres annually, use has dropped. Paraquat use is now estimated at around 5% of statewide cotton acres (Dr. Randall Norton, personal communication). According to pesticide use data, reported mean annual use has declined from roughly 4,300 acres from 2019-2022 to about 12,500 acres from 2015-2018. These are conservative estimates of use because most ground applications do not require reporting.

Reasons for declining use cited by licensed Pest Control Advisors (PCAs) in Arizona include:

- Many growers do not wish to pursue required certification training to make use of paraquat, either by air or ground, given the expense of training and certification and the availability of other options for desiccation such as Aim (Carfentrazone-ethyl) or ET (pyraflufen ethyl), which do not require training.
- Much cotton in central Arizona and throughout the state is grown in proximity to alfalfa, which is prone to white spotting from the slightest overspray of paraquat. This impacts alfalfa quality and value, potentially making it unmarketable, which is a liability issue for growers applying paraquat. A few may opt to apply by ground instead of air, but most decline to use paraquat in these situations.
- In recent years, paraquat has only been available locally in large quantity totes, with the minimum size being 120-gallons. This is far more paraquat than most growers can make use of. Some custom applicator companies purchase it for use in for-hire applications.
- It is common for growers in Arizona to produce cotton on seed contracts which require harvesting of the seed as well as cotton lint. One disadvantage of paraquat to seed production is that relative to other defoliation/desiccant options, paraquat increases the chances of immature seeds making it into the harvest, which lowers the quality of seed harvested.

Despite declining use in Arizona, paraquat remains a valuable and important tool, and one that is preferred by some growers and PCAs, because, despite its drawbacks, it is “the best product available for cotton desiccation”. It is a highly effective boll opener, and a single application “gets the job done.” One PCA interviewed estimates his growers’ use paraquat on about 5,000 acres of cotton annually, almost all of that applied aerially. Between 2015 and 2022, 91% of reported paraquat uses on cotton were applied by air. It is important to note that all aerial applications require reporting to the state whereas ground applications made by a grower using their own equipment do not. Furthermore, we are aware from a separate analysis of insecticide use data (Ellsworth & Fournier 2024, submitted manuscript) of a general decline in reporting over the past few years, because ground applications have increased relative to aerial applications in some communities, at least for some pesticides. In any case, PCAs interviewed confirm that a large majority of all paraquat applications for cotton defoliation are made by air, and access to aerial applications remains critical for us.

As noted in our prior comments (Fournier et al. 2019), “there are many situations in which paraquat is essential to enabling a timely, successful cotton harvest. For example, when weather conditions result in regrowth of leaves prior to harvest, or if there is a freeze after application of the first defoliant. Because paraquat is fast acting, it allows a grower to quickly get on with harvesting in these situations. Multiple weather events impacting harvest can occur in late fall

and winter in Arizona, and a paraquat application can make the difference between a grower turning a profit on the crop or taking a loss."

Addressing Issues of Remaining Risks to Human Health

EPA has very clearly and transparently explained the decision-making process behind its Interim Registration Review decision for paraquat, including its risk-benefit analyses and the rationale behind decisions such as retaining aerial defoliation in cotton, a 7-day restricted entry interval for cotton harvesting following application, and large and small acre ground applications in cotton and other crops, despite some remaining human health risk concerns. Our goal is to provide EPA with relevant information on practices and equipment used in Arizona that might suggest even lower remaining health risks than what EPA has estimated.

Aerial Applications to Cotton as a Harvest Aid

EPA's risk models suggest that aerial applications to cotton as a harvest aid pose potential inhalation risks to aerial applicators, assuming 1,200 acres treated by an applicator in a 24-hour time period at the 0.5 lb paraquat AI/acre.

Pest control advisors knowledgeable about paraquat use in cotton said they would not expect this level of exposure to occur. "A single grower would not defoliate that much cotton all at once because you couldn't harvest it fast enough." A grower might typically harvest about 100 acres of cotton at a time. Another point made was that this much paraquat use in a day by a single applicator would be unlikely anymore, given the relatively low amount of use around the state. However, according to Dr. Randall Norton, University of Arizona Area Extension Agent, we cannot fully rule out the possibility that a single custom applicator, working for several growers, could reach or exceed treatment of 1,200 acres of cotton in single day during peak defoliation season. There are only so many custom applicators, and much of the cotton in need of defoliation around the same time. However, a prior analysis of single-pilot aerial applications per day (in this case for endosulfan, Ellsworth 2006) suggests it would be rare for a single pilot to cover 1,200 acres in a day. This analysis found that fewer than 10% of prescriptions for endosulfan reached EPA's proposed limit of 900 lbs. a.i. per day, which would equate to 643 acres at the then-maximum use rate in Arizona of 1.5 lbs ai / A or 900 acres at the common rate used in mixture applications of 1.0 lbs ai / A. On average, there were about 30 pilot-days each year when EPA's proposed limit was exceeded for endosulfan, but this is about half to 75% of the number of acres of concern for paraquat, at 1,200 acres. In short, we think this level of use would be extremely rare, if not implausible, in Arizona.

Post-Applications Exposures During Cotton Harvest

EPA has identified certain exposure scenarios that can occur during cotton harvesting activities following defoliation with paraquat at rate of 0.5 lb. AI/acre with a 7-day restricted entry interval (REI). EPA's risk modeling is based on detailed descriptions of harvest activities from Eberhart & Ellisor 1993. In this section, we wish to clarify typical modern harvesting practices in Arizona, which are quite different from the assumptions in EPA's model. Also, we assume that many of the technological advancements in cotton harvesting described below are in no way unique to

Arizona, and that EPA should consider updating exposure estimates according to modern methods and equipment used by today's growers.

Dr. Randall Norton is a University of Arizona Extension Agronomist, Area Agent, and Director of the Safford Agricultural Center. For many years, Dr. Norton has run annual cotton variety trials throughout cotton production regions of Arizona. In this work, he regularly interacts with growers and custom applicators to harvest cotton. Over his career, he has seen dramatic technological advancements in cotton harvesting, from the last of the trailer-harvested cotton and the widespread adoption of module-builder harvesters in the early 1980s, to a shift in the first decade of the 2000s to the current equipment used.

One factor that makes harvesting practices consistent across the state is the prevalence of custom harvesting, that is, companies that specialize in harvesting grower acres on a for-hire basis. Dr. Norton estimates that outside of Graham County, which represents about 20% of statewide acres where all cotton is grower-harvested, a high percentage of cotton statewide is custom harvested—about 90% in Yuma and Cochise Counties and 60-70% in Pinal County. Custom harvest companies are invested in the most efficient modern technologies to accomplish their work—technologies that greatly reduce the potential for human exposures to paraquat.

Currently, custom harvest companies use the John Deere round bale module harvester on nearly 80% of statewide acreage. Another 15% of acres are harvested with the CaseIH square module building picker. Currently, less than 5% of acres are harvested with a traditional module-building basket harvester as described in EPA's document. Dr. Norton predicts that within the next 5 years, that will likely drop to zero acres. The first CaseIH square bale picker was released in 2006 and the John Deere round bale picker around 2008. These technologies caught on quickly because they make harvesting much more efficient. Very few farms in Arizona have used the trailer harvesting technique since the mid 1990s.

This modern harvesting equipment eliminates the traditional roles of the raker and the tramper, and greatly minimizes potential exposure of the picker operator who drives and operates the machine without direct contact with cotton in the module building process. The harvester has enclosed cabs equipped with air filters that greatly minimize the potential for dust or particulate matter in the cab. The machine picks the cotton then wraps harvested cotton in plastic to form the module. The process is automated and eliminates direct exposure of workers to treated foliage or cotton during harvesting.

We believe that EPA's reliance on outdated information on the cotton harvesting process (Eberhart & Ellisor 1993) for the paraquat risk assessment has greatly over-estimated worker exposure rates for harvesting procedures of today. Based on the equipment and procedures now in use, there is no tramping, there is no raking, and the operator of the harvest equipment never comes into contact with the cotton prior to or during the module building process. The only time a worker may be exposed is when servicing the machine. The harvesters must be cleaned on a daily basis (a role previously associated with the raker). Also, with the CaseIH equipment (but not the John Deere), a worker is still required to put tarps over the modules during the harvesting process.

Regarding the 7-day REI for cotton harvest activities: While it can be important to get into the field to harvest in a short timeframe (to avoid a weather event, for example), some growers may wait (when feasible) as long as 14 to 18 days after a paraquat application to pick cotton. This gives the product more time to work, getting more bolls to open, and can help to maximize yield. Although the 7-day REI can be critically important in some situations, only a portion of cotton would be harvested this quickly after application.

Potential inhalation risks for ground applicators in enclosed cabs: high-acreage applications
EPA identified potential inhalation risks for ground applicators making certain high acreage (more than 80 acres) applications using enclosed cabs. Of the crop scenarios where EPA identified remaining health risks, only cotton and potentially fallow land would be relevant for us, based on Arizona use patterns of paraquat. An analysis of reported ground applications in cotton (2010-2022) revealed only 58 applications exceeding 80 acres (this represented 57% of reported ground sprays.) For fallow ground applications, only 128 out of 1,322 applications, about 9.7%, were above 80 acres. While the numbers are low across a 13-year span of data, these would be conservative estimates of potential exposure because growers applying paraquat using their own ground rigs would not be required to report those applications to the state.

Similar to the discussion above regarding modern harvesting equipment, the vast majority of commercial growers in Arizona are using modern spray equipment, including enclosed air-conditioned cabs with advanced air filtering. According to a knowledgeable contact at CaseIH, all modern equipment including sprayers and tractors for various uses (including harvesting) have been using advanced filtration systems for several years now. "Particularly in the sprayers, the cabs are pressurized to 50 pascals via an automated charcoal filtration system that operates through the HVAC system. The pressurization of the cab is monitored and has an indicator in the cab to alert the operator if the pressurization drops below 50 pascals." This option is available for tractors as well, but it is standard equipment on CaseIH sprayers. The contact did not know for certain but stated it is likely that similar standard equipment is installed on most sprayers manufactured for use in the U.S. Hopefully, EPA has already considered modern standards of air filtration in sprayers in its estimates of remaining inhalation risks to ground applicators, but if not, we hope this information will be of use.

Dr. Norton and several pest control advisors confirmed that virtually all ground applications are made using sprayers with enclosed cabs, all of which are air-conditioned. Regarding the use of PF10 respirators by applicators operating enclosed cabs, all parties interviewed agreed with USDA's assessment that use of a respirator within the cab could potentially pose a visibility hazard while operating equipment.

Potential inhalation risks for ground applicators in open cabs with PF10 respirators: low-acreage applications
EPA identified potential inhalation risks for ground applicators in open cabs making certain low acreage (less than 80 acres) applications of paraquat. Of the crop scenarios where EPA identified remaining health risks, lettuce is the only crop with significant reported paraquat applications in Arizona, all by ground. (A small number of applications are also reported on brassica crops and

melons, primarily watermelons). For lettuces, reported applications between 2010 and 2019 ranged from around 450 to 1,800 acres, with an annual mean of 1,022 acres treated with paraquat. This is a conservative estimate, not only because ground applications made by growers with their own equipment do not require reporting, but also because some applications to prepare lettuce fields for planting could be reported as fallow field applications in the database. Three PCAs who work with producers of lettuce (and other vegetable crops) in the Yuma region (where the majority of lettuce and vegetable crops are produced) noted that virtually all the tractors used for spraying have enclosed cabs. However, this may not be the case for smaller operators across the state, who may lack the capital to invest in tractors with an enclosed cab.

Conclusion

We hope this information is helpful to EPA in developing its response and finalizing any changed to Interim Registration Review Decision for paraquat. Please feel free to contact the authors if you have any questions.

References

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