



Comments in Response to EPA's Preliminary Work Plan for Urea Sulfate

Prepared by Alfred Fournier, Randy Norton, Peter C. Ellsworth
Arizona Pest Management Center, University of Arizona

Docket ID: EPA-HQ-OPP-2025-0164
November 3, 2025

To Whom It May Concern:

The Arizona Pest Management Center is host to the University of Arizona's expert IPM scientists including Ph.D. entomologists, weed scientists and plant pathologists with expertise in the strategic tactical use of pesticides within IPM programs that protect economic, environmental and human health interests of stakeholders and the society at large. In coordination with the Western Integrated Pest Management Center, we contribute to federal comments on issues of pest management importance to stakeholders throughout the desert southwest including Arizona, New Mexico, Nevada, Colorado and the southeast desert regions of California.

We submit these comments in response to the Agency's Preliminary Work Plan for the cotton defoliant active ingredient urea sulfate, EPA Docket number EPA-HQ-OPP-2025-0164, on behalf of Arizona stakeholders. Our comments combine stakeholder input received from University of Arizona Extension Specialists, licensed pest management professionals, and reported pesticide use data from the Arizona Pest Management Center Pesticide Use Database (Fournier et al. 2017). We appreciate this opportunity to respond with data and input from experts and informed users of urea sulfate to help inform registration review.

Our Data and Expert Information

Through cooperative agreements with Arizona Department of Agriculture, the Arizona Pest Management Center obtains use of, improves upon, and conducts studies with ADA's Form 1080 data. Growers, pest control advisors and applicators complete and submit these forms to the state when required by statute as a record of pesticide use. These data contain information on 100% of custom-applied (i.e., for hire) pesticides in the state of Arizona. Grower self-applied pesticide applications may be under-represented in these data. In addition, the Arizona Pest Management Center is host to scientists in the discipline of IPM, including experts in the usage of this and other compounds in our agricultural systems. We actively solicit input from stakeholders in Arizona, including those in the regulated user community, particularly to better understand use patterns, use benefits, and availability and efficacy of alternatives. The comments within are based on the extensive data contained in the Arizona Pest Management Center Pesticide Use

Database, collected summary input from stakeholders and the expertise of APMC member faculty.

Arizona Cotton Production

In 2024, production of Arizona cotton topped 280,000 480 lb. bales, including both Upland and Pima cottons. In addition, cotton seed production was valued at over \$32 million (USDA NASS 2025). In 2022 (latest economic figures available), Arizona produced 250,000 bales of Upland cotton on 88,000 acres with a value exceeding \$122 million (USDA NASS 2023). Arizona often leads the world in cotton yield per acre (>1550 lbs.), nearly twice the U.S. average, contributing 9,000 jobs and \$700 million to Arizona's economy in 2011 (anonymous 2012).

Urea Sulfate Role in Arizona Cotton Defoliation

Urea sulfate is only available as a single end-use product, currently marketed in Arizona as CottonQuik. This premix of urea sulfate (58.6% + ethephon 18.3%) has historically been a popular cotton defoliant. The product provides a unique approach among defoliant choices. The ethephon opens bolls by speeding cotton maturity, while the urea sulfate facilitates burndown of the foliage (desiccation) for ease of harvesting. Furthermore, the urea sulfate acts as a synergist to improve the uptake and effectiveness of ethephon, increasing its movement within the plant. Urea sulfate's properties, particularly its acidity, enhance the activity of ethephon, leading to more consistent results, especially under cooler weather conditions (Edmisten & Collins 2023).

While effective, Arizona growers may not always need the extra "burndown" you get from the urea sulfate component. According to Dr. Randy Norton, Extension Area Agent and Director of the Safford Agricultural Center, many growers have in recent years shifted to straight ethephon products without the urea sulfate component (e.g., Ethephon 6 or Setup). This observation is supported by the Arizona Pest Management Center Pesticide Use Reporting database, which shows a steady decline in reported annual applications of CottonQuik between 2018 and 2024. In addition, interviews with pest control advisors (PCAs) from central and southeastern Arizona counties (Pinal, Maricopa, Pima, Graham and Cochise) further support this trend.

While all PCAs interviewed indicated that CottonQuik provides effective defoliation, reasons for switching included short-term difficulty obtaining sufficient CottonQuik several years ago, cost considerations, and the desire for more flexibility in approach—particularly, to increase the rate of ethephon by tank-mixing a stand-alone ethephon product like Boll Buster 6 (55.4% ethephon) with Redi-Pik (diuron + thidiazuron). Redi-Pik and similar products with these two active ingredients remain perhaps the most popular defoliants in Arizona, with an estimated 75% of cotton acres receiving applications most years (Fournier et al. 2022). Other growers prefer to apply either Redi-Pik or a stand-alone ethephon product followed by a PPO inhibitor (e.g., Aim [carfentrazone-ethyl] or Sharpen [saflufenacil]). This one-two punch approach provides an advantage over Cotton Quick, in that the delay between treatments can allow optimal timing of the desiccant component (second application). On the other hand, a disadvantage of using a PPO inhibitor is that retreatment may be necessary due to cotton regrowth following ill-timed rains.

The trend away from urea sulfate-ethephon mixtures is not universal. Success of defoliation can be affected by many factors, including moisture level, temperature, timing, local conditions, and even the picking equipment to be used. There are a variety of approaches favored by different

growers and PCAs. Some still prefer CottonQuik. One PCA applies CottonQuik every year, at least on some fields, as a follow up spray after Redi-Pik. The diuron + thidiazuron combination in Redi-Pik induces a maturing process in the cotton plants, which triggers leaf drop to help facilitate harvest, but at times under certain conditions defoliation may be incomplete. A second application with CottonQuik effectively cleans up the field and gets the plants ready for efficient harvest. CottonQuik, by all reports, is an excellent product and does a good job with defoliation, as long as applications are well timed. Another benefit of urea sulfate is that its desiccating effect can be helpful to hasten defoliation if cotton plants remain vigorous after late rain or irrigation.

Though not the most popular or a single effective approach, CottonQuik with urea sulfate provides a unique approach among defoliant choices, and this variety of choices is valued by growers. For example, with late rains in Arizona in 2025, we might see an increase in urea sulfate use this year. Another reason it is important to maintain all available options for defoliation is the potential loss of existing options to regulatory review considerations. For example, should EPA determine a need to limit rates or to cancel registrations of diuron products in the future, the loss of Redi-Pik would be devastating to our growers without the option of shifting back to CottonQuik.

Responses to “Guidance for Commenters” questions

What factors influence you to use urea sulfate instead of available alternatives, particularly products containing only ethephon? For example, what are the strengths and weaknesses of urea sulfate?

- It is first important to understand the distinct roles of the two active ingredients. The urea sulfate component in CottonQuik enhances the effectiveness of ethephon, acting as a synergist, improving plant-uptake of ethephon and increasing its movement within the plant. In addition, urea sulfate is a desiccant that dries down and defoliates the plant, independent of ethephon. Ethephon’s role is to help mature and open the bolls to enhance cotton harvest.
- Stand-alone ethephon products may have an advantage in situations where growers want a higher rate of ethephon than is available in the premix. But ethephon is always applied in combination with other products (sequentially or in tank mixtures). Ethephon alone will not defoliate cotton. Ethephon-only products are typically used in combination with Redi-Pik or with PPO inhibitor products like ET, Aim or Sharpen.
- Another advantage of an ethephon-only product followed by either Redi-Pik or a PPO inhibitor is that it provides more grower control over the timing of the second application, allowing the ethephon to reach its fullest effect before applying the follow-up defoliant application.

What environmental considerations factor into your decision to use urea sulfate?

Generally, environmental considerations are not a factor in a decision to use or not use urea sulfate. CottonQuik provides a very effective approach to defoliation, among other effective approaches. The only environmental factor mentioned that might influence a decision to use urea sulfate is the need to speed up time-to-harvest by desiccating plants after a late season rain or irrigation.

**What cotton varieties and types (Pima, upland) are you using urea sulfate to defoliate?
Does cotton variety factor into your decision to use urea sulfate? If so, in what way?**

Urea sulfate has been used effectively and with satisfaction on both Pima and Upland cotton types. According to PCAs, it is used without specific consideration of cotton variety and seems to be effective across the range of varieties grown throughout Arizona.

However, an element linked to variety that has some influence on a preference for urea sulfate is cotton determinacy, or late season vigor. That is, for varieties that are more indeterminate, including some Pima and some Upland varieties, late season vigor leads to excessive foliage production and difficulties in defoliation. This places more interest in desiccant type harvest aids like CottonQuik, though typically in mixtures with other products.

We appreciate this opportunity to comment on the use and importance of urea sulfate on Arizona cotton at this early stage of registration review. Please contact me if you have any questions.



Dr. Alfred Fournier, Associate Director,
Arizona Pest Management Center
Maricopa Agricultural Center
University of Arizona
37865 Smith-Enke Rd., Maricopa, AZ 85138
fournier@cals.arizona.edu

References

Anonymous. 2012. Research-Based Integrated Pest Management (IPM) Programs Impact People, Communities and the Economy of Arizona. University of Arizona Cooperative Extension, Arizona Pest Management Center.
https://cals.arizona.edu/apmc/docs/APMC%20Impact%20narrativep1-4_4-29-14.pdf

Edmisten, K., & G. Collins. Cotton Defoliation. Chapter 12 in 2023 Cotton Information, an Extension publication of North Carolina State University.
https://content.ces.ncsu.edu/pdf/cotton-defoliation/2023-01-23/202ssible_FINAL.pdf

Fournier, A.J., William McCloskey, Blase Evancho, W.A. Dixon II. 2022. Response to EPA Proposed Interim Decision for Diuron. Docket ID: EPA-HQ-OPP-2015-0077. 7/27/22.
https://acis.cals.arizona.edu/docs/default-source/ipm-assessment-documents/arid-swpmc-info-requests/comment-reponses/diuron_pid_07-27-22_vf.pdf

Fournier, A., W. Dixon, P.C. Ellsworth. 2017. Arizona Pest Management Center Pesticide Use Database. University of Arizona Cooperative Extension.

USDA NASS 2022. 2025 State Agricultural Overview: Arizona. United States Department of Agriculture, National Agricultural Statistics Service.

https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=ARIZONA

USDA NASS 2023. Arizona Agricultural Statistics 2022. United States Department of Agriculture, National Agricultural Statistics Service.

https://www.nass.usda.gov/Statistics_by_State/Arizona/Publications/Annual_Statistical_Bulletin/2022/AZAnnualBulletin2022.pdf