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Response to EPA's Occupational and Residential Exposure Assessment for the Registration of DCPA

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Introduction

The EPA is seeking public comments in response to the Occupational and Residential Exposure Assessment for the registration of DCPA. EPA's risk assessment has identified several significant risks of concern for occupational handlers and post-application field workers, as well as non-occupational spray drift concerns. The Agency took the extraordinary step of drafting a companion document to notify the public of these newly identified potential exposure risks. We thank EPA for providing this information, which we quickly shared with agricultural stakeholders via our email network. We have since reached out (for the second time in 14 months) to several Pest Control Advisors (PCAs) familiar with the use of DCPA in broccoli, cauliflower, cabbage and other cole crops, as well as onions, to inform them of EPA's concerns and to learn more about the use of DCPA in crop production. Our goal at this time is to inform EPA about specific use patterns and application methods for DCPA in agriculture in Arizona and adjacent desert regions of Imperial County California, and to provide stakeholder input on the benefits of DCPA, potential alternatives, and the viability of non-chemical methods (hand weeding).

Background

Arizona growers are one of the leading producers of fresh-market vegetables in the U.S., producing vegetables and melons at an estimated total economic contribution of over $2.5 billion in 2015 (Kerna et al. 2016). In 2022, Arizona produced nearly 21,000 acres of broccoli, cauliflower, and cabbage combined, with an estimated farmgate value over $270 million. In addition, Arizona is a leading producer of high-quality seed onions, which are exported to many growing regions, including the Pacific Northwest. The large majority of vegetable production is centered in Yuma, Arizona and the surrounding area in Yuma County and adjacent Imperial County, California.

Southwest desert vegetable growers face many challenges, including water limitations, labor shortages and costs, and effective management of weeds, which can greatly impact crop yields and reduce economic outcomes for crops like broccoli and cauliflower. Growers must rely on a narrow range of generally quite old chemistries to manage weeds, and herbicide resistance is a growing problem. Many available herbicides no longer effectively control certain weed species, and newly seeded or transplanted onions and brassica crops can be especially sensitive to weed competition, making it difficult for growers to establish robust stands. While protection of farm workers is paramount, these issues will complicate a transition to alternative weed management practices for onions and brassica crops, should changes in DCPA registrations make current uses unavailable or impracticable for growers.

Use of DCPA on Arizona Crops

According to the Arizona Pest Management Center Pesticide Use Database (Fournier 2017), DCPA is used primarily on cole crops and onions, with the most significant level of reported use in broccoli, cauliflower, cabbages (including Napa), Bok choy, Kale and onions, including onions, cabbage and broccoli grown for seed. Records also reveal limited uses in melons (cantaloupe and watermelon), mustards, collards, turnips and radish. In Arizona, only custom (for hire) applications require reporting to the state Department of Agriculture, along with odiferous compounds and any soil-applied applications of active ingredients on the Arizona Department of Environmental Quality groundwater protection list. (DPCA is not on the list.) Because many herbicide applications are applied by growers using their own equipment, herbicide use is often under-represented in the database.

Based on discussions with licensed Pest Control Advisors (PCAs), who work directly with growers to make pesticide recommendations in these crops, DCPA (Dacthal) is a very important tool for weed management in both cole crops and onions. A single application at the start of the growing season provides broad and consistent control weed control. As EPA notes in the Companion Document (EPA 2023), DCPA is both the most expensive and the most broadly efficacious of herbicides available for use on these crops. Despite its expense, it has become the industry standard in broccoli, cauliflower, cabbage and other cole crops, as well as onions. As one PCA put it, other available herbicides “don’t come close” in terms of the level of control, especially for tough weeds like purslane.

Cole Crops

Broccoli and cauliflower represent 69% of reported applications of DCPA in Arizona. Both crops can be either direct seeded or transplanted, although, according to industry sources, the majority of broccoli acres in the Yuma region are direct seeded, while most of cauliflower is transplanted. In Arizona, DCPA is used to some extent on both directed seed and transplanted acres for both crops, though some PCAs report only using it on direct seeded crops. Local experts and PCAs acknowledge DCPA as the best choice for efficacy and range of control for desert weeds in brassicas. It is applied after seeding or transplanting by chemigation or by ground. Ground applications are typically banded over the beds. According to one PCA, in direct-seeded broccoli, most applications by ground; in transplanted broccoli, most applications are chemigated. Based on reported use data, about 24% of all applications in broccoli are chemigated and 76% are by ground. For cauliflower, about 56% of applications are chemigated

and 44% are by ground. Though the label allows for aerial applications, these are almost entire absent in the data.

Typically, a single application of DCPA is sufficient to control the full spectrum of weed challenges for the better part of the season. Some PCAs report that a single application of Dacthal can provide season-long control. One PCA who works in broccoli grown for seed reports that about 70% of the time a single application is sufficient, potentially with some hand weeding late in the season. Other times they may follow up with a second herbicide. A range of rates are used, often well under maximum label rate for brassicas of 14pts /A. According to PCAs, banded rates typically range between 6 to 10pts (4.5 to 7.5 lbs. ai/A) of Dacthal Flowable. An analysis of reported uses across both crops showed that less than 9% of applications were made at full label rate. The mean rate is 5.9 lbs. ai/A (median 5.2 lbs. ai/A). One PCA noted that DCPA is particularly important for mid-winter plantings of broccoli, as there are certain weeds that Prefar (bensulide) and other alternatives cannot control as well as Dacthal.

Onions

Similar to cole crops, DCPA has become the standard for weed control in onions. DCPA is especially important in onions grown for seed, which have a growing season as long as 5 months. Effective weed control is essential at the start of the season. Seed onions can be difficult to germinate and get a robust stand, so minimizing weed competition at stand establishment is critical. A leading PCA reports that Dacthal is the only herbicide they use. A single application at 9 pts./acre is applied pre-emergence to saturated soil. It works so well they don't need to hire a weeding crew, which results in net savings for the grower, despite the high cost of the product. Labor availability is also an issue, so this efficacious herbicide is highly valued by growers. Others report the need for a follow-up spray with a different herbicide later in the season (e.g., GoalTender). Another experienced PCA described DCPA as a "must have" for onions, indicating "We have few alternatives for this crop."

Both ground sprays and chemigation are used in seed onions. Analysis of reported uses shows that 57% of applications across all onions are chemigated, and the balance are by ground.

Radish

One PCA indicated that his largest concern would be the potential loss of the use of DCPA on radishes grown in Imperial County, California. He indicates that Dacthal is the only herbicide labeled for radishes there that is both crop-safe and efficacious. It is applied by ground, broadcast, at a rate of 8 to 10pts/A, well below the maximum label rate.

Alternative Herbicides and Non-chemical Control

Alternatives

Pest Control Advisors identified a number of potential alternatives to DCPA in cole crops and onions, each with their own drawbacks. Nothing can match the range of weed species controlled by DCPA, and its use helps to minimize the need for additional herbicides and expensive hand-weeding.

Oxyfluorfen (e.g., GoalTender) is identified by some PCAs as the main alternative to DCPA. It is labeled for post-emergent use on broccoli/cabbage/cauliflower and onions, including onions grown for seed, but it is not registered for use on other cole crops, such as kale and Bok choy. The main concern with oxyfluorfen is damage to neighboring crops. In the Yuma region, it can be difficult to find a field of broccoli or cauliflower that isn't bordered by lettuce, a crop which is highly sensitive to damage from Oxyfluorfen. Except for a very short window at the start of the broccoli season (prior to the start of the lettuce season), most growers will avoid use of oxyfluorfen. Another difficulty PCAs report is that you cannot use GoalTender when there is cloud cover or any level of wind. Oxyfluorfen also can damage the appearance (and marketability) of cole crop plants. Some growers in the Yuma region have stopped using oxyfluorfen altogether due to these concerns. In the PPO-inhibitors herbicide class, oxyfluorfen is the only herbicide with moderate volatility (more prone to lift and vapor drift), as compared to some other herbicides in the same chemical class which are registered and widely used on other crops (e.g. flumioxazin and carfentrazone).

Bensulide (e.g., Prefar) is a pre-emergent organophosphate herbicide labeled for use across a range of crops, including cole crops, cucurbits and onions. Prefar is registered for use on direct seeded cole crops and onions, and also has a 24c SLN registration in Arizona for POST applications in transplanted broccoli, cauliflower and cabbage. Based on feedback from PCAs, Prefar provides effective control of purslane, but poor control of several other key weed species in desert crops, leading to the need for an additional herbicide. Some examples of winter weeds against which DCPA exhibits greater activity compared to bensulide include common chickweed (*Stellaria media*), little mallow or cheeseweed (*Malva parviflora*), mustards (*Brassica* spp.), burning nettle (*Urtica urens*), London rocket (*Sisymbrium irio*), and sowthistles (*Sonchus* spp.) Some summer annuals examples included groundcherries (*Physalis* spp.), common lambsquarters (*Chenopodium album*), nightshades (*Solanum* spp.), needleleaf goosefoot (*Chenopodium murale*).

Trifluralin (e.g., Treflan) is a selective pre-emergent herbicide registered for use on certain cole crops, including broccoli, cauliflower, cabbage, and brussels sprouts. It is also registered on kale and onions as well as cucurbits. According to the label, it controls certain broadleaf and grassy weeds, including johnsongrass, lambsquarters and common purslane, but lacks the broad range of control of DCPA. Weeds such as morningglory are not controlled. DCPA has greater activity than trifluralin on groudcherries, cheeseweed, mustards, nightshades, London rocket, and sowthistles.

Clopyralid (e.g., Stinger) provides selective postemergence control of broadleaf weeds in cole crops but is not registered for use in onions. Based on feedback from PCAs, this product effectively controls groundcherry, but not purslane, leading again to the need for a second application of different herbicide.

As a sidenote, some years ago, when Dacthal became unavailable in onions for about two years, growers secured an Arizona Special Local Needs (SLN) registration for Prowl (pendimethalin) + Prefar (bensulide), which was used in place of Dacthal. One PCA reports it was fairly effective, except for purslane escapes, which required follow-up applications with GoalTender.

Impact of Loss of DCPA / Hand Weeding

There is no doubt that costs of weed control will increase for growers, should registrations of DCPA be lost in these crops. Costs would include additional herbicide applications, an increase in the amount of hand weeding, and potential losses in the form of reduced yields. A limited amount of hand weeding already occurs, even with the use of DCPA—no more than one pass-through where needed. In the absence of Dacthal, one PCA estimates it could take three or more passes of hand weeding to keep broccoli and cauliflower clean enough to maintain current yields. Costs for hand weeding have increased significantly in recent years. Costs can range from $50 to $100/acre. In addition, the region has experienced labor shortages in recent years, like other areas of the country.

Another potential detrimental impact of losing DCPA in the cole crops integrated weed management toolbox would be the resulting increased selection pressure on Prefar (bensulide) and consequently increased chances of herbicide resistance issues (DCPA belongs to a different Site of Action compared to bensulide and trifluralin).

We hope that EPA will consider this information and find it helpful in its registration review decision for DCPA. We strongly support the need to ensure the safety of farm workers and bystanders. We also hope that with the implementation of appropriate and reasonable mitigations, important uses of DPCA might be maintained in Southwest crop production.

Who We Are

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.

Dr. Al Fournier is Associate Director of the APMC / Associate Specialist in Entomology, holds a Ph.D. in Entomology, and has expertise in evaluating adoption and impact of integrated pest management and associated technologies. He serves as an Integrated Pest Management Network Coordinator through the Western IPM Center Signature Program, representing stakeholders in the desert Southwest states in EPA registration reviews. Dr. José Dias is Assistant Professor and Extension Weed Scientist in the School of Plant Sciences at University of Arizona, based at the Maricopa Agricultural Center. He works with producers throughout the state on weed management, resistance management, genetic technologies and other issues. Mr. Wayne Dixon holds a B.S. in Computer Information Systems and develops tools and data used in IPM research, education and evaluation, including management of the APMC Pesticide Use Database.

These comments are the independent assessment of the authors and the Arizona Pest Management Center as part of our role to contribute federal comments on issues of pest management importance and do not imply endorsement by the University of Arizona or USDA of any products, services, or organizations mentioned, shown, or indirectly implied in this document.

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 Form1080 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, we actively solicit input from stakeholders in Arizona and other Southwest states (Nevada, Colorado, New Mexico and Southeastern California), 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.

References

EPA. 2023. Companion Document to the Occupational and Residential Exposure Assessment for the Registration Review of DCPA. U.S. Environmental Protection Agency. May 26, 2023. https://www.regulations.gov/document/EPA-HQ-OPP-2011-0374-0082

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

Kerna, A., D. Duval, G. Frisvold, A. Uddin. 2016. The Contribution of Arizona's Vegetable and Melon Industry Cluster to the State Economy. University of Arizona, College of Agriculture and Life Sciences, Cooperative Extension. https://economics.arizona.edu/contribution-arizona%E2%80%99s-vegetable-and-melon-industry-cluster-state-economy

USDA NASS. 2023. 2023 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