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Proposed Interim Decision for Linuron & Its Use in Arizona Carrots, Celery, Cilantro, Parsley and Parsnips

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Summary

- The EPA is seeking public comments in response to its Proposed Interim Decision (PID) on linuron, including proposed rate changes and extended Restricted-Entry Intervals (REIs) for some crop / re-entry scenarios.
- Our goal at this time is to inform the EPA about specific crop practices in Arizona that may have bearing on estimated levels of field worker risk following linuron applications, and therefore on proposed Restricted-Entry Intervals (REIs). We also respond to proposed rate changes and deletions.
- With respect to the use patterns and benefits of linuron, we wish to incorporate information from comments previously submitted by the Arizona Pest Management Center (APMC) during the draft risk assessment public comment period, Docket ID# EPA-HQ-OPP-2010-0228-0036, and referenced herein.
- Growers and agricultural professionals are most concerned with the proposed Restricted-Entry Interval exceptions requiring a 13-day REI for hand-set irrigation activities in carrot, celery and parsley. Because fields must be dry prior to application of linuron, and due to the water requirements of crop plants in our desert system, the 13-day REI is not workable for our growers.
- **It may be necessary for EPA to clarify its definition of "hand-set irrigation" with respect to the practices herein described.**
- Use of furrow irrigation in carrots and celery greatly limits the potential for contact of irrigation workers with treated plants. For the most part, workers do not need to enter the field to irrigate. Irrigation ditches are typically offset 20–35 feet from the actual planted crop and treatment area.
- Parsley is sprinkler irrigated and workers need to enter the field to irrigate following linuron application. However, parsley is rotary mowed close to the ground prior to linuron treatment, which results in little to no crop foliage in the field at the time of irrigation and therefore far less chance of worker contact with the treated crop.

Linuron use in Arizona Agriculture

Linuron is highly efficacious against a broad range of weeds, but does not harm plants in the Apiaceae (Umbelliferae) family, which includes celery, carrots, cilantro, parsnips and parsley. It has a long soil residual compared to most other herbicides. These factors make it very important to the production systems of apiaceous crops. These plants have a dense growth habit, which makes either mechanical or hand-weeding difficult, labor intensive, and cost-prohibitive for growers. Linuron is relatively inexpensive and highly effective. Its long residual makes it effective in these cropping systems, which have long growing seasons. Licensed pest control advisors (PCAs) in Arizona have previously emphasized the critical role of linuron in these production systems (Fournier et al. 2017). According to the Arizona Pest Management Center (APMC) Pesticide Use Database, reported uses of linuron in recent years have been limited to celery, carrots, cilantro, parsnips and parsley. 100% of reported use is in the dry flowable formulation.

Prometryn is the most commonly used alternative and/or rotational chemistry for post-emergent weed control in these crops. However, some growers do not use prometryn, due to concerns with high volatility and plant-back restrictions (Fournier et al. 2017). There are few other registered herbicides available to growers for these crops.

Response to Linuron Proposed Interim Decision

Use Rates & Deletions

Members of the agricultural community that provided input on the proposed interim decision (PID) were glad to learn of EPA's proposed decision to maintain linuron registrations so critical to these crops in our production system. The proposed deletion of certain uses, such as non-crop areas, and corn, potato and sorghum uses of the DF formulation, do not appear to be problematic for our growers.

Regarding proposed use rate reductions for celery, cilantro and parsley, for the most part, proposed rates are in line with current use practices. One exception was noted by a pest control advisor working in celery, where linuron (Lorox DF) is typically applied after the crop has recovered from transplanting and begun to grow out. The proposed 1 lb. a.i./acre rate is effective when the weeds are small. The problem is, for some planting dates there can be a significant amount of weed growth during the period when celery is recovering from the shock of transplanting. When weeds are larger, a 1.25 lb. a.i./acre rate is needed in these situations for effective control. This statement was supported by reported use rates in the APMC Pesticide Use Database, where about 7% of reported applications in celery were over the proposed use rate of 1 lb. a.i./acre. More typical use rates in celery range from 0.5 to 1.0 lb. a.i./acre. Proposed maximum seasonal use rates do not appear to be problematic for these crops, as, in most cases a single application is used. Some carrot producers use two applications of linuron, but at rates below the seasonal maximums.

Restricted Entry Intervals

While we understand and agree with the need to limit risks of linuron exposure to field workers, agricultural professionals expressed some confusion and much concern about the proposed

extension of Restricted Entry Intervals (REIs) in some situations. **We hope that by providing detailed descriptions of current irrigation practices in these crops following linuron applications, we can improve EPA's understanding of potential risks to workers based on real-life practices.** It may be necessary for EPA to clarify its definition of "hand-set irrigation" with respect to the practices herein described. It is unclear to us whether EPA's definition is limited to situations where workers need to place or move pipes that are near the crop and adjacent furrows, or if the meaning is more inclusive than this. Arizona practices for most of these crops rely on water delivered to the furrow from adjacent irrigation ditches at some distance from the crop rows (at least 10, but typically 20 to 35 feet). A siphon pipe feeds water into the furrows without workers having to come into contact with the crop.

Carrots

Carrots are grown from seed, and are initially sprinkler irrigated. Following stand establishment, sprinklers are pulled out of the field, after which the crop is furrow irrigated. Linuron is applied as an over-the-top post-emergent treatment, typically when carrots are about 3 inches tall. By the time of application, sprinklers have been removed from the field and irrigation water is delivered through the furrows, typically within about 4 days of application. This is done by initiating water flow from the irrigation ditch (10 to 35 feet from the crop rows) into the furrow using a siphon tube. **Workers do not enter the rows or get close to the crop unless there is an issue with a furrow being blocked, in which case they might need to do some shovel work to ensure proper flow of water.** However, even in these cases, shovel work is done outside of the crop, directed at the bucks or small berms that are put in place by mechanical equipment.

Desert production of carrots, as well as celery, parsley and other crops, is dependent upon regular irrigation. Linuron is applied by ground using a tractor, and thus requires that fields are sufficiently dried out prior to application. This means that relatively soon after the linuron treatment, the crop will need to be irrigated. One pest control advisor estimated that, based on the water needs of the plant, carrot irrigations are generally 10 to 14 days apart in sandier soils, and 16 to 18 days apart in heavier soils, though this also varies based on temperature throughout the year. Soils can take up to 7 days to dry out following an irrigation before a tractor can enter the field. This means that, particularly in sandier soils, an irrigation will be needed within a few days of the linuron spray.

Some clarity may be needed as to whether the proposed 13-day REI applies to furrow irrigation practices as described. That is, irrigation is delivered from ditches that are usually 10—35 feet from the crop; siphon tubes are hand set into the ditches and deliver water over the side of the ditch. I.e., the irrigator (minus any shovel work) may never be closer than 10–35 ft to the crop and treated area. If these practices fall under the definition of hand-set irrigation, the proposed REI would not be workable for the growers, given crop water needs and cropping practices as described above.

Some carrot growers leave sprinkler pipe in the field throughout the growing season, on risers between some crop rows. In these cases, pipes are placed in the furrows immediately adjacent to crop, typically 10 or 20 rows apart. This is a situation where tending the pipes, if needed following linuron application, would put workers in close proximity to treated plants.

Celery

Celery is grown from transplants. After the crop is transplanted, some growers will run sprinklers, laying pipe every 8 to 12 rows, and water for 4 days at establishment. One large grower prefers to "sub-irrigate," which means they hold the water in the field for 2 to 3 days in order to establish the transplants. Following stand establishment, sprinkler pipe (if used) is removed from the field. From that point on, most growers use furrow irrigation, though some use drip irrigation. Linuron is applied over-the-top by ground rig when plants are about 8 to 10 inches tall. To furrow irrigate, workers initiate a siphon pipe from the main irrigation ditch at one end of the field. There is typically 20 or 30 feet between the irrigation ditch and the edge of the field, i.e., the crop and treated area is offset 20–30 feet away from the ditch. Typically, workers setting irrigation following linuron application would be at least 10 feet from the treated plants. As one pest control advisor put it, "You can still irrigate and keep people out of the field."

Similar to carrots (or any crop), the field needs to dry down following irrigation and prior to the application of linuron, which is applied by ground. Following linuron application, celery is often in need of irrigation within a day or two, though there is some variation, based on temperature.

Parsley

Parsley is grown from seed using sprinkler irrigation. In the case of parsley, sprinklers are not removed, but are maintained for irrigation throughout the growing season. This is a situation where irrigators need to go into the field in order to turn on the sprinklers.

Parsley is a multiple-harvest crop, producing from 2 to 4 cuttings. Over the cropping season, growers deal with various seasonal weeds. A pre-emergent herbicide is applied, which typically lasts up until the first harvest. Parsley is harvested by hand, then the crop is mowed with a rotary mower, cut close to the ground, then linuron is applied over the top to kill germinated weeds and to provide residual weed control. Typically, growers irrigate within a few days or a week of that first cutting. It is important to note, there is almost no foliage on the parsley plants when linuron is applied, limiting any incidental contact between workers and treated plants.

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 works with the Western IPM Center, representing stakeholders in the desert Southwest states in EPA registration reviews. Dr. Peter Ellsworth is Director of the APMC, State IPM Coordinator for Arizona and Professor of Entomology / Extension IPM Specialist with expertise in developing IPM systems in cotton and other crops

and measuring implementation and impact of IPM and pest management practices. 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, 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.

References Cited

Fournier A.J., B.R. Tickes, W.B. McCloskey, W.A. Dixon II, P.C. Ellsworth. 2017. Linuron Use in Arizona. University of Arizona, Arizona Pest Management Center. Docket ID# EPA-HQ-OPP-2010-0228-0036.
https://www.regulations.gov/document?D=EPA-HQ-OPP-2010-0228-0036