



**Linuron Use in Arizona**  
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**Comments submitted by the Arizona Pest Management Center**  
**University of Arizona**

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**Summary**

- Linuron is highly efficacious against a broad range of weeds, but does not harm plants in the Apiaceae family, which includes celery, carrots, parsnips and cilantro. Linuron is inexpensive and highly effective. It has a long soil residual compared to most other herbicides. These factors make it very important to the production system for cilantro and carrots and other crops in this plant family.
- Information provided by three licensed pest control advisors (PCAs) in Arizona all support the need for this herbicide in cilantro, carrots and parsnips. The only alternative, prometryn, is less effective, has plant back restrictions which limit its use, and can result in drift issues, damaging neighboring crops. The long soil residual for linuron means a single application over the top can control weeds all season, even under intense irrigation.
- There are very few other herbicide options that will work for these crops in Arizona. The PCAs interviewed agreed that loss of linuron in any of these crops would either result in great economic losses for growers, or discontinuation of production for these crops.

**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. Peter Ellsworth is Director of the APMC, State IPM and Pesticide 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. Dr. Al Fournier is Associate Director of the APMC / Adjunct 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 a Comment Coordinator for the Western IPM Center, representing stakeholders in the desert Southwest states. 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. Dr. William McCloskey is an Associate Professor and Extension Specialist in Weed Science, with experience in field crops, including cotton, and tree fruit and nut crops. Mr. Barry Tickes is weed scientist and Area Agricultural Agent and County Director in western Arizona, with expertise in vegetable crops.

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 Form L-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 compound 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.

### **Linuron use in Arizona**

University of Arizona Area Agriculture Agent and Weed Scientist, Barry Tickes works extensively in the vegetable production systems of Yuma County, Arizona. He explains that linuron is a herbicide which kills most plants, except those in the Apiaceae (umbiliferae) family. This family includes some important vegetable crops, most notably for Arizona, celery and carrots, but also parsnips, cilantro and other crops. Linuron is inexpensive and highly effective. It has a long soil residual compared to most other herbicides, which is part of the reason many growers do not use it. However, the combination of its properties make it particularly useful in certain crops, especially celery, carrots and parsnips. Prometryn is the most commonly used alternative.

According to the APMC Pesticide Use Database, linuron is used primarily in celery and carrots, with fewer records for parsnips and cilantro. These are not large-acre crops in Arizona, but its use is consistent from year to year with no significant applications recorded on other crops for the past eight years.

According to a pest control advisor (PCA) in Yuma County, Arizona, Linuron (Lorax DF) is extremely important in production of celery, carrots and cilantro. Celery acres in Yuma, Arizona

have increased significantly in recent years, and to a lesser extent, so has carrot production. But this would not have been possible without linuron. The production system and biological aspects of these plants (celery and carrots) make weed management extremely challenging. These crops are grown over a long period (120+ days). Once the plants grow out, the large canopy rules out any mechanical weed control methods because it cannot be done without damaging the crop. “Linuron works great for us because it can be sprayed over the top of the crop with very minimal or no crop damage, and it provides very effective weed control and is affordable for growers. It has a long soil residual, which is important because these crops require a lot of water. The long residual maintains effective weed control under these watering conditions, and only a single application is needed each season. Before we went to the current production system relying on linuron, weed management was so challenging and expensive that some growers were ready to give up on celery. Without this herbicide, we would be in a world of hurt.” Asked about potential alternatives, he mentioned the use of Caporal (prometryn) as an over-the-top application in place of linuron. “Caporal is also effective, but it is volatile and there are concerns about drift to other sensitive crops in our production region. This makes linuron a much better choice.”

Growers in central Arizona produce at least 2,500 acres of carrots most years. One pest control advisor spoke to me about the importance of linuron in carrot production. “This is far and away the herbicide of choice for carrots. Other products registered on carrots are not efficacious enough. Caporal (prometryn) has plant-back restrictions that don't work for our growers, and it does not have the same range of control that Lorox does. It is not a good alternative. Linuron is so efficacious, we use carrots as a rotational crop intentionally to clean up problem weedy fields rotating out of other crops such as melons or alfalfa.” This same PCA works with a celery grower in central AZ with less than 200 acres. He indicated they do not use linuron, only a single pre-plant application of Prefar (bensulide). This works for them because they plant the crop in late October or early November, in a dense planting. This approach would not work in Yuma, where they plant celery much earlier.

A different pest control advisor and his grower, a carrot producer in central Arizona, spoke about linuron with Dr. Bill McCloskey, UA Extension Weed Science Specialist, in the course of identifying some weed species for them. Both grower and PCA indicated that although the acreage of carrots in Arizona is not great, linuron is a critical need on those acres, for many of the reasons stated above. Typically, it is the only post-emergent herbicide that they use in carrots, with one broadcast application over-the-top. They also use a pre-emergent, pendimethalin or trifluralin. “If we didn't have the Lorox in carrots, I don't know what we would do. There are not many alternatives, and none that work as well.”

This PCA also works with a grower in parsnips. This is a small acre specialty crop with very few registered herbicides. They use Lorox DF as a pre-emergent application (its only labeled use in that crop). There are no other viable alternative herbicides for parsnips in Arizona. “It offers some control. The fields are still weedy, but we can get a crop out of it. It's all we have.”