



**Methomyl and Thiodicarb use in Arizona Agriculture**  
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**Comments submitted by the Arizona Pest Management Center**  
**University of Arizona**

EPA Docket ID: EPA-HQ-OPP-2010-0751

Date: June 7, 2019

**Summary**

- EPA is seeking public comments in response to new draft human health risk assessments for methomyl and thiodicarb.
- EPA's risk assessments identified risks of concern from methomyl for drinking water from ground water sources, and from non-occupational spray drift at the edge of the field for children 1 < 2 years old for both aerial and ground applications.
- At this time, our goal is to inform EPA about two critical use patterns for methomyl, in lettuce and onions.
- Methomyl is one of relatively few efficacious insecticides used in rotation and mixtures for control of western flower thrips in lettuce and onions, and for onion thrips in onion.

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**Thiodicarb**

Thiodicarb is registered as a commercial seed treatment for cotton (Aeris), a Restricted Use Pesticide limited to use in commercial seed treatment equipment. According to University of Arizona Extension Agronomist Dr. Randy Norton, there is use of treated seed among Arizona cotton growers for control of nematodes and seedling insect pests. No other Arizona uses of thiodicarb were identified.

**Methomyl**

Many Arizona production systems have all but eliminated the use of methomyl, a carbamate insecticide. However, it remains important for control of key pests in a few crops. Based on information from the Arizona Pest Management Center (APMC) Pesticide Use Database (Fournier et al. 2017) from 2011 to 2018, methomyl was used annually in lettuces (head, leaf, romaine, onions (including seed onions) and cole crops (primarily cabbage and broccoli), although methomyl uses represent a small percentage of crop acres on an annual basis. Methomyl is occasionally used (not every year) in a few other crops, including alfalfa, melons, cotton and corn. The most significant and regular usage occurs in lettuces and onions. The

majority of methomyl use in desert crops is the SP formulation of Lannate. LV and SL formulations are also used. A small proportion of applications (<2%) are WSP formulations (Fournier et al. 2017).

### Lettuce

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). This includes over 90% of all fresh lettuce consumed in the U.S. in the winter, valued at over \$891 million in the past annual season (USDA-NASS 2018).

Based on an annual survey of pest control advisors (PCAs) who work with the lettuce industry, methomyl (e.g., Lannate) was used on 33.4% and 39.5% of Fall 2017 and Spring 2018 head lettuce acres, respectively (Palumbo 2018b). The survey included responses from 25 surveys representing 44,180 Fall 2017 acres and 37,720 Spring 2018 acres. These surveys are conducted as part of the Western IPM Center Crop Pest Losses Signature Program (WIPMC 2018). According to the (APMC) Pesticide Use Database (Fournier et al. 2017), from 2011 to 2018, head lettuce, leaf lettuce and romaine showed fairly consistent annual use of methomyl in Arizona (Table 1). It is important to note that not all Arizona agricultural applications require reporting, so Table 1 may underestimate total methomyl use (see “Our Data and Expert Information” section below).

**Table 1: Reported Methomyl Use by Lettuce Type, Acres Treated, 2011 - 2018**

	<b>Head</b>	<b>Leaf</b>	<b>Romaine</b>
<b>2011</b>	12618	10523	2898
<b>2012</b>	9667	8015	2889
<b>2013</b>	3525	4463	1289
<b>2014</b>	6454	5571	1941
<b>2015</b>	5390	5773	2485
<b>2016</b>	12621	11024	4706
<b>2017</b>	8138	8286	3575
<b>2018</b>	7769	5584	3721

*Source: The Arizona Pest Management Center Pesticide Use Database, unpubl. This database captures only reported usage, which may reflect a fraction of total actual use (see narrative).*

A primary use of methomyl in Arizona lettuce production is for control of Western Flower Thrips (WFT). This insect has a broad host range, including melons, onions, cotton, alfalfa and other crops, and is identified as a “serious economic pest” of leafy vegetables, where it is present season long (Palumbo 2018a). In head, leaf, romaine and baby mix lettuces, as well as cabbage and spinach, WFT cause cosmetic scarring to leaves. Higher temperatures drive WFT development, which tend to be at their worst in hot, dry weather. WFT adults and nymphs feed on both upper and lower leaf surfaces and leaf folds, in protected inner leaves. Large populations can cause a significant amount of cosmetic blemishing on marketable leaf portions and result in excessive trimming and reduced plant weights. Damaged areas can form necrotic lesions during

post-harvest storage and transport. Growers are also concerned about the presence of live thrips in harvested product.

Methomyl use in lettuce is largely targeting western flower thrips, although it also has efficacy for aphids and lepidopteran larva. For thrips control in lettuce, guidelines recommend methomyl used in combination with other insecticides (e.g., spinetoram, spinosad, acephate, pyrethroids) (Palumbo 2018a). Pest control advisors asked about methomyl use mentioned the importance of rotating with other chemistries to avoid resistance issues. When rotating modes of action, in lettuce as well as onions and cabbage, they tend to lead with efficacious reduced risk products, such as spinetoram (Radiant), going to methomyl later if an additional treatments are warranted. Rates of Lannate SP range from 10 to 16 oz., and are split among aerial and ground applications. About 42% of reported uses for all methomyl use on lettuce are by air. Biological and cultural practices have not demonstrated a large impact on thrips populations in our system, and relatively few insecticides are strongly efficacious against thrips. It is important for the Arizona produce industry to maintain access to methomyl for use in rotation with other effective insecticides for control of western flower thrips.

Dr. John Palumbo, University of Arizona Extension Entomologist notes, “The availability of new modes of action with activity against western flower thrips would certainly reduce the industries reliance on OPs and carbamates. However, because of the intensive pest spectrum that PCAs face in the desert coupled with the demands for high quality lettuce, there will still be a need for broad spectrum products (i.e., pyrethroids)” (Palumbo 2018a).

### Onions

Methomyl is used on onions and seed onions grown in Arizona to manage onion thrips and western flower thrips. Western flower thrips can weaken onion stalks and slows plant growth. High populations of onion thrips can reduce both yield and storage quality of onions. Onion thrips are known to vector iris yellow spot virus, a disease which causes straw-colored lesions on leaves. Severe instances can reduce bulb size and may cause lodging (plant toppling) during seed set, reducing seed production (Swett et al. 2019).

Methomyl is one of few efficacious insecticides labeled for thrips control, and is used in rotation with spinetoram (Radiant) and spinosad (Success). On seed onions, two to four applications of Lannate SP are used at the 0.50 to 0.75 lb. rate, in rotation with these other chemistries, for resistance management. About 88% of reported applications in all types of onion go on by air (Fournier et al. 2017).

### 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 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. 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. John Palumbo is the University of Arizona Extension Entomologist with many years of experience working on integrated pest management of insect pests for vegetable crops in Arizona, particularly for leafy greens, cole crops and melons. 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. Ms. Madyson Hampson is a student intern working in our program.

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.

Through the Crop Pest Losses and Impact Assessment program, partially funded through the Western IPM Center, the Arizona Pest Management Center conducts annual surveys with state-licensed pest control advisors (PCAs), who are the primary pest management decision makers, in consultation with growers. The surveys, conducted at face-to-face meetings, provide detailed information on crop yield losses to specific insect pests, weeds and diseases, control costs, and pesticide use for the key crops, cotton and lettuce. Cotton data have been collected since 1991 and lettuce data since 2005. Data are collected for all of Arizona and neighboring production regions of California, with typical responses representing up to 65% of acres planted in Arizona.

These data provide detailed information on shifting pest trends, chemical use and costs, and often compliment and augment information from the APMC Pesticide Use Database, particularly for pesticide uses for which the state does not mandate reporting.

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