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Use and Importance of Spirotetramat in Arizona Agriculture
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Comments submitted by the Arizona Pest Management Center,
University of Arizona

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Please note: We wish to integrate into the current submission previous comments on spirotetramat drafted by Dr. Peter C. Ellsworth and submitted to EPA on February 8, 2010 by the Arizona Pest Management Center, University of Arizona. (Hereafter referred to as Ellsworth 2010). Because a search of spirotetramat-related dockets on the Regulations.gov website was unsuccessful at finding the comments, they are incorporated at the end of this current submission.

Spirotetramat Use in Arizona Agriculture

As a reduced-risk, selective insecticide, spirotetramat provides a novel chemistry for controlling aphid and whitefly pest species without disrupting natural controls of other species in desert vegetables. The fully systemic action of this foliar pesticide is virtually unique among pesticides registered for use against aphids and whiteflies, key pests of vegetables and other desert crops. Use of spirotetramat specifically, and increased use of other selective reduced-risk chemistries in Arizona vegetable production in general, has greatly reduced use of broad-spectrum neurotoxic chemistries, thereby lowering environmental and worker exposures to these higher-risk chemistries (Ellsworth 2010). For example, in head lettuce, since 2010 use of selective, reduced-risk insecticides have overtaken the use of more broadly toxic options. This trend has accelerated since 2015. As of 2019, nearly 60% of acres treated receive selective insecticides (Palumbo 2019, fig. 7).

Lettuce and other vegetable crops. 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. In 2019, the combined value of production for head lettuce, leaf lettuce and romaine exceeded $1.6 billion in 2019, with production on 71,300 acres (USDA-NASS 2019).

Based on 2019 Lettuce Pest Losses survey data, Movento remains the second most commonly used product for aphid and whitefly control in spring and fall lettuce. According to this survey,

22,825 acres of head lettuce were treated in spring 2019 and 3,756 acres in the fall 2018 (Palumbo 2019). 81.5% of pest control advisors (PCAs) made an average of 1.3 applications on 52.8% of spring 2019 head lettuce acres. In fall head lettuce, 33.3% of PCAs made an average of 1.1 applications on 10.6% of acres.

In addition to its use on lettuce and other leafy vegetables (e.g., spinach, arugula, Swiss chard, mustards) spirotetramat is important for aphid management in cole crops (broccoli, cauliflower, cabbage, kale), including in broccoli seed production. In 2019, Arizona harvested a combined 16,600 acres of broccoli and cauliflower valued at $186 millio (USDA-NASS 2019). According to a pest control advisor familiar with production practices, spirotetramat is "absolutely critical to production of broccoli seed," where it is used for aphid management. In broccoli and cauliflower, 1 to 2 applications at near full rate are used. One is applied before bloom, and, if needed, a second treatment occurs after blooming has concluded.

Celery. Spirotetramat is also important in celery production, where one to two applications are used to control aphids.

Potatoes. Based on the APMC Pesticide Use Database, potatoes are treated annually with spirotetramat (between 1,400 and 3,600 acres reported from 2015 through 2018) (Fournier 2017). Typically, a single application at the 4.5 oz rate is used for control of green peach aphid, potato leafhopper and potato psyllid.

Pecans. Arizona 2019 pecan production was valued at over $41.7 million (USDA-NASS 2019). Spirotetramat is used in June and/or September, for control of green peach aphid and other aphids. It is used in rotation with Sivanto (flupyradifurone), for resistance management.

Lemons. In 2019, Arizona harvested a combined 7,300 acres of lemons valued at $186 million. (USDA-NASS 2019). Spirotetramat is used to control citrus nematode, and extends the effectiveness of citrus thrips control by 7 to 14 days. It is applied once annually, near the full label rate, typically in a tank mix with Delegate (spinetoram)**.**

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. Dr. John Palumbo is a Research Scientist in Entomology and an Extension Specialist working with the

Arizona vegetable industry. 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.

Through the Crop Pest Losses and Impact Assessment program (WIPMC 2018), 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.

References

Ellsworth, P.C. 2010. Spirotetramat Use in Arizona. Comments submitted to EPA by the Arizona Pest Management Center, University of Arizona. Feb. 8, 2010. [NOTE: These comments, previously submitted to EPA, are referenced by inclusion at the end of this submission.]

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://cals.arizona.edu/arec/sites/cals.arizona.edu.arec/files/publications/AZ%20Vegetable%20and%20Melon%20Economic%20Contribution.pdf

Palumbo, J.C. 2019. Insecticide Usage on Desert Lettuce, 2018-2019. Vegetable IPM Update, Vol. 10, No. 12. University of Arizona. https://cals.arizona.edu/crops/vegetables/advisories/docs/190626-insecticide-usage-summary-in-lettuce-2018-19.pdf

USDA NASS. 2019. 2019 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

WIPMC. 2018. Crop Pest-Losses and Impact Assessment. Western Integrated Pest Management Center. http://westernipm.org/index.cfm/center-projects/signature-programs/crop-pest-losses-and-impact-assessment/

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We are faced with the following set of facts.

1) Spirotetramat sale and distribution could become unlawful, despite its current legal presence and use within desert vegetable systems. All quoted text from EPA documents.

> *"In the absence of any action by EPA, all sale and distribution of formerly-registered spriotetramat products will be unlawful under FIFRA once the vacatur goes into effect."*
>
> *"Without action by EPA, the termination of the registrations could thus make illegal not just any sale, but any further movement of material currently in the hands of distributors or retailers (FIFRA section 12(a)(1)(A) (7 U.S.C. §136(j)(a)(1)(A)) makes it a violation of FIFRA for any person to sell or distribute an unregistered pesticide), and subject any seller/distributor to potential civil or criminal penalties under FIFRA section 14 (7 U.S.C. §136l)."*

2) This change in status could leave the user community with ambiguous market and regulatory signals, and may lead to use patterns that do not conform to currently in force label requirements.

> *"Thus, in the absence of EPA action, users of unregistered pesticides are not obligated to follow the labeling (which, for registered pesticides, prescribes enforceable conditions for using the particular pesticide, among other things) accompanying the product. Therefore, once the registrations are terminated, unless EPA takes action, persons holding stocks of spirotetramat will not be legally precluded from using those stocks without following label directions, including the restrictions on timing of applications that EPA required in order to protect bees."*

3) EPA has the authority to develop guidelines for sale and use of existing stocks that could allow the safe and effective use of spirotetramat currently in marketing channels and in users hands.

> *"The Administrator may permit the continued sale and use of existing stocks of a pesticide whose registration is suspended or canceled under [sections 3, 4 or 6 of FIFRA] to such extent, under such conditions, and for such uses as the Administrator determines that such sale or use is not inconsistent with the purposes of [FIFRA]."*

4) While the procedural anomaly that led to this court decision is unique, the EPA has ample guidance from previously established policy for handling cancelled pesticides.

> *"Regarding cancelled pesticides, the existing stocks policy identifies particular considerations relevant to five different cancellation scenarios: 1) cancellations where the Agency has identified particular risk concerns; 2) cancellations where a registrant has failed to comply with an obligation of registration; 3) cancellation of products while subject to data call-in notices under section 3(c)(2)(B) of FIFRA; 4) cancellation of registrations subject to reregistration requirements and label improvement programs; and 5) other voluntary cancellations."*

> *"Thus, EPA identified in the policy statement six criteria it might consider in making such risk benefit decisions, including: 1) the quantity of existing stocks at each level of the channels of trade; 2) the risks resulting from the use of the existing stocks; 3) the benefits resulting from the use of such stocks; 4) the financial expenditures users and others have already spent on existing stocks; 5) the risks and costs of disposal or alternative disposition of the stocks; and 6) the practicality of implementing restrictions on distribution, sale, or use of the existing stocks."*

Our goal in commenting on spirotetramat end of stocks use in Arizona is to prevent unacceptable economic, environmental and public safety risks consistent with EPA guidelines in the registration of any pesticide.

> *"That determination, like the initial decision to register a pesticide, will focus on the social, economic, and environmental risks and benefits associated with such sale and use."*

Spirotetramat is recently registered and available for use in desert vegetables grown in Arizona. Despite its recent appearance in the marketplace, researchers have been examining this active ingredient in Arizona production systems for more than four years. As a reduced-risk, selective insecticide, spirotetramat affords users a novel chemistry for controlling aphid and whitefly pest species without disrupting natural controls of other species and creating better safety for the user and consumer. All quoted text that follows is from a recently published scientific paper by Drs. John Palumbo and Steve Castle in Pest Management Science (2009).

> *"Many of the modes of action for these new chemistries exploit alternative nerve receptor sites, novel physiological processes and other key biochemical functions specific to insects.[32] This has not only made them safer for the user and consumer, but in many cases more efficacious than the neurotoxins used in the past."*

However, the fully systemic action of this foliar pesticide is virtually unique among pesticides registered for use against this pest complex.

> *"Another systemic insecticide, spirotetramat (ketoenol), was recently registered for use on desert produce crops. Although it has no practical soil activity, following foliar application and uptake, the insecticide is translocated acropetally and basipetally within the entire vascular system.[36] Research to date has shown excellent residual activity against aphid species such as* Nasonovia ribisnigri *Mosely and* Aulacorthum solani *Kaltenbach in lettuce that typically require repeated applications for economic control.[37] Again owing to its foliar systemic activity, spray coverage with spirotetramat is not as critical as with many older, conventional compounds."*

The opportunities for efficient control and therefore lower exposure of users and the environment to a suite of broad-spectrum neurotoxic chemistries is very important in our production system and consistent with our local efforts to transition growers to safer, more selective IPM systems.

> *"…the changeover of IPM to safer and more effective insecticides from highly toxic, broad-spectrum insecticides of previous decades has been a welcome development. In addition to the positive attributes already described, many of the newer compounds are used at greatly reduced rates in lettuce and leafy vegetables that result in lower pesticide loads in the environment."*

The transition in our desert vegetable industry to lower risk, selective chemistries is key to the reduction of broadly toxic insecticides in our system, more efficient and economical control of target pests, and creating more safety for users, consumers, and the environment.

> *"Overall, the use of newer, selective compounds over the past decade in desert produce crops has certainly reduced the risk of exposure to toxic insecticide residues for consumers and farm workers….Perhaps the most telling sign has been the overall reduction in the number of foliar spray*

> *applications made to desert lettuce crops over the years, [where] in the 1980s, an average of 12 – 15 sprays were applied to lettuce annually…. in 1996, growers applied an average of nine foliar insecticide applications to lettuce. Most recently, … a range of 4 – 7 foliar sprays were applied to lettuce crops in 2007."*
>
> *"These data suggest that overall usage of the broadly toxic chemistries on head lettuce has declined steadily over the past 5 years, but, more importantly, since 1996 the usage of organophosphates and carbamates on desert head lettuce alone has declined significantly. In contrast, the use of the selective insecticides on lettuce has increased almost twofold over this same 14 year period.*

In addition, our most recent history (2009) shows a major shift in insecticide use patterns in desert head lettuce. Our most broad spectrum chemistries (endosulfan, acephate, diazinon, and dimethoate) have decreased by over 50%. In fact without exception, all active ingredients declined precipitously in 2009 once spirotetramat (and two other selective active ingredients) was introduced to the marketplace (see Table 1 from Palumbo & Castle, 2009). Spirotetramat was used on nearly 3/4ths of the lettuce acreage last year.

> *"Results from the 2009 University of Arizona pest management workshop estimated that, for the first time, these broadly toxic compounds were actually applied to fewer acres of desert head lettuce than the selective insecticides (Palumbo JC, unpublished data)."*

Our current work to examine non-target effects of spirotetramat in cotton is beginning to show the selective advantages of having such chemistry in our desert systems. While data analyses are ongoing, spirotetramat appears to be as selective as its related chemistry spiromesifen in our system. We determined in prior work that spiromesifen is "fully selective" in our cotton system affording users a new option for conserving the significant natural controls and pollenation services present in cotton (Ellsworth & Naranjo, unpubl. data).

In short, spirotetramat is not only a safe and efficient insecticide in our desert vegetable systems, it is helping the entire industry transition to a more completely selective and therefore superior IPM system for these fresh market commodities. **We urge EPA to preserve the legal use of spirotetramat through the end of stocks period. All indications are that there are no new risks associated with this important product. On the contrary, the data are compelling that we are creating an environment where more reduced-risk chemistries are used than the broadly toxic conventional compounds. EPA, by acting now to insure the organized and legal use of this active ingredient, will be protecting the public and environment from the risks of increased usage of broadly toxic insecticides that will otherwise have to be used in place of spirotetramat in our fresh market vegetable systems.** This would be a large step backward for our industry and represent a major economic hardship as well. Furthermore, we support EPA in taking swift action to restore all previously approved Section 3 uses of spirotetramat. We also look forward to new labels for this critical active ingredient coming forth quickly in 2010 (e.g., in cotton and other agricultural crops).

References

Palumbo J.C. & Castle S.J. 2009. IPM for fresh-market lettuce production in the desert southwest: the produce paradox. *Pest Management Science* 65: 1311-1320. Available online: *http://www3.interscience.wiley.com/cgi-bin/fulltext/122653066/HTMLSTART*.

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Table 1. Estimated usage of broadly toxic (organophospahtes, carbamates, cylodienes and pyrethroids) and selective (reduced- and low-risk) insecticide chemistries on head lettuce in Arizona, based on NASS and PCA surveys[18,25]

	Estimated number of head lettuce acres treated *(total acres in production)*					
Insecticides	1996 *(55 000)*	2005 *(50 000)*	2006 *(48 000)*	2007 *(45 500)*	2008 *(46 000)*	2009 *(46 000)*
Broadly toxic chemistries						
Pyrethroids	256 960	182 030	169 894	148 376	150 739	147 726
Methomyl	207 900	45 150	48 114	30 986	22 523	16 555
Thiodicarb	23 595	0	0	0	0	0
Endosulfan	36 630	17 760	17 566	20 020	16 480	8 118
Acephate	27 720	9 433	6 376	11 386	14 128	9 396
Diazinon	10 285	15 800	21 758	9 646	12 150	5 075
Dimethoate	56 760	14 656	8 050	3 829	3 487	0
Total usage	*619 850*	*284 829*	*271 758*	*224 243*	*219 507*	*186 870*
Selective chemistries						
Bacillus thuringiensis	74 250	1 125	288	0	0	0
Abamectin	11 495	0	0	0	0	0
Imidacloprid	11 550	36 443	40 488	22 818	29 973	19 890
Emamectin benzoate	–	4 483	11 928	16 124	10 670	6 989
Methoxyfenozide	–	32 728	33 926	28 494	27 141	16 740
Spinosad/spinoteram	–	114 438	103 144	82 257	98 382	85 590
Indoxacarb	–	6 363	10 609	8 395	9 994	2 475
Pymetrozine	–	7 508	3 755	1 081	432	0
Acetamiprid	–	–	10 654	19 963	9 118	1 238
Spiromesifen	–	–	1 272	1 145	2 800	585
Flonicamid	–	–	–	10 385	17 738	3 420
Spirotetramat	–	–	–	–	–	33 953
Chlorantraniliprole	–	–	–	–	–	16 509
Flubendiamide	–	–	–	–	–	4 500
Total usage	*97 295*	*203 088*	*216 064*	*190 662*	*206 248*	*191 889*