Agricultural Experiment Station
Cooperative Extension

37860 West Smith-Enke Road
Maricopa, Arizona 85138
(520) 568-2273
FAX: (520) 568-2556

Thiamethoxam: Response to EPA Proposed Interim Decision for Arizona and the Desert Southwest

Prepared by Alfred Fournier, John C. Palumbo, Peter C. Ellsworth & Wayne Dixon
Comments submitted by the Arizona Pest Management Center, University of Arizona

EPA Docket ID: EPA-HQ-OPP-2011-0581
Date: May 4, 2020

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. In coordination with the Western Integrated Pest Management Center, we contribute to federal comments on issues of pest management importance to stakeholders throughout the desert southwest including Arizona, New Mexico, Nevada, Colorado and the southeast desert regions of California.

At this time, we wish to respond to the Agency's Proposed Interim Decision for the insecticide thiamethoxam, on behalf of stakeholders. In doing so, we wish to incorporate by reference three previously submitted EPA comments from 2017, identified by the docket ID number below. The entirety of our comments combines stakeholder input received from University of Arizona Extension Specialists, surveys and telephone interviews with licensed pest management professionals from Arizona and New Mexico, and reported use data for thiamethoxam from the Arizona Pest Management Center Pesticide Use Database.

Prior Comments, incorporated by reference:

- Neonicotinoid Insecticide Use and Pollinator Protection in Several Crops and Recreational Turf in Arizona and New Mexico. University of Arizona, Arizona Pest Management Center. Jul 24 2017. Docket ID: **EPA-HQ-OPP-2011-0920-0100**.

Thiamethoxam Use in Southwest Agriculture

Thiamethoxam is primarily used on lettuces, spinach and cole crops in Arizona, though to a lesser extent than imidacloprid. There are also reported uses on other vegetables and pecans, and its use on chile peppers in New Mexico is considered critical to control of a yield-limiting plant virus. Over the past 8 years, thiamethoxam represents about 16% of reported neonicotinoid uses across all crops, according the Arizona Pest Management Center (APMC) pesticide use database (Fournier 2017). Like other neonicotinoids, thiamethoxam products provide very effective alternatives to broad-spectrum insecticides and help to preserve some natural enemies for

biological control of insect pests in many crops, making this active ingredient a valuable component of integrated pest management (IPM) programs. While much of the information we provide is derived from Arizona stakeholders and pesticide use data, many described use patterns are broadly representative of thiamethoxam use and importance throughout the desert Southwest.

Lettuce / Brassica / Cole 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, valued at over $891 million in 2018. Arizona produces fresh market broccoli, cauliflower and cabbage. In 2018, over 20,300 combined acres harvested were valued at over $172 million (USDA-NASS 2019).

While neonicotinoids were used on 93% of fall head lettuce acres in 2018, and 89% of acres in spring 2019, a relatively small portion of this is attributed to thiamethoxam. Endigo and Actara were used on 33% and 1.2% of spring 2019 head lettuce acres, respectively, based on pest control advisor responses to Lettuce Pest Losses surveys (Palumbo 2019, WIPMC 2018).

Both soil and foliar uses of thiamethoxam products are unaffected by EPA's proposed interim decision (PID). It is possible that foliar uses of thiamethoxam products could increase following implementation of proposed registration changes for other neonicotinoids.

Melons

Arizona produces fresh market cantaloupe, watermelons and honeydew. In 2017, 19,400 combined harvested acres produced fruit valued at nearly $128 million (USDA-NASS 2018). With limited agricultural land available in Arizona, and limited water, the majority of Arizona producers, including all large melon growers, rely on subsurface drip irrigation systems and re-plant melons in the same fields, often double-cropping.

Thiamethoxam and other neonicotinoids are important to control whiteflies, which vector cucurbit yellow stunting disorder virus (CYSDV), which impacts, melons, watermelons and squash. Fruits from infected plants often taste bad due to a reduction in sugars, making them unmarketable, leading to economic loss. The virus is transmitted from plant-to-plant exclusively by the whitefly vector, *Bemisia tabaci = B. argentifolii*. The disorder is almost always associated with whiteflies; it does not take many insects to spread the virus (Davis et al. 2017). Since the virus first appeared in Arizona melons in 2006, aggressive control of *B. tabaci*, especially whitefly adults, has been the best defense.

Thiamethoxam is one of several neonicotinoids reportedly used on melons annually since 2013. It receives less use than dinotefuran, imidacloprid or acetamiprid, according to the APMC Pesticide Use Database. For example, in 2017, thiamethoxam represented only 9.5% of reported neonicotinoid uses on melons. Most years, dinotefuran has been the number one neonicotinoid reportedly used on melons, and no changes for its use on cucurbits are being proposed by the EPA at this time.

According to Dr. John Palumbo, Extension Entomologist and Research Scientist with University of Arizona, the EPA's proposed label changes "may impact spring melon production for some growers but should have little impact on fall melons" (Palumbo 2020). In the case of thiamethoxam, loss of foliar uses based on the EPA's proposed crop stage-based restrictions are not seen as problematic for the following reasons:

- Soil applications of thiamethoxam at planting and sprinkler chemigation treatment during stand establishment are still permitted, and represent efficacious alternatives to imidacloprid for control of whiteflies and seedling pests, respectively.
- There are several alternative insecticides available for control of immature whiteflies in melons, including pyrifluquinazon, afidopyropen, cyantraniliprole, pyriproxyfen, buprofezin and spiromesifen.
- The neonicotinoids dinotefuran and acetamiprid remain available and research has shown they are more efficacious than thiamethoxam foliar sprays.

Growers in Arizona have many practices in place to protect pollinators (Killian 2016), and melons are no exception. In some cases, pest control advisors maintain long-term, ongoing relationships with bee keepers, and this contributes to their excellent communication. In these cases, there have been no issues with bee kills. Delivery of insecticides via drip helps to minimize the number of sprays and potential exposure of bees to insecticides, and all foliar applications are applied at night (between nightfall and 4 am) so that the chemical is dry in the morning by the time bees are actively foraging.

EPA should note, there are apparent contradictions in proposed wording within the Clothianidin and Thiamethoxam PID with respect to crop stage-based application restrictions. The wording provided in table 5 on page 62 describing the crop stage-based application restrictions for cucurbits is not consistent with the language in tables 1 and 2 of Appendix B, pp. 83, 84 and 95 for "all outdoor foliar spray uses."

The language in Appendix B states, "For foliar spray application to crops not under contract pollinator services: Do not apply this product while bees are foraging. Do not apply this product until flowering is complete and all petals have fallen off unless the application is made in response to a public health emergency declared by appropriate State or Federal authorities." **These proposed changes would impact current language in the 'Bee Box' for all outdoor foliar spray uses of these products**. These changes were not discussed in the body of the PIDs, and are only present in the appendices of the PIDs for imidacloprid, clothianidin & thiamethoxam, and dinotefuran. The changes would broadly eliminate needed bloom applications for crops where previous exemptions were made. We hope that this language in the PID Appendix tables was mistakenly included, but ask that EPA clarify.

Chile Peppers

In 2018, Arizona produced 1,100ac of chile peppers valued at over $2.6 million (USDA-NASS 2019). In 2019, New Mexico produced 8,700ac valued at over $50 million. Chile peppers are the third most valuable crop in New Mexico, following pecans and hay (USDA-NASS 2020)

Neonicotinoid insecticides are used to protect young seedling peppers from damaging flea beetles, and for early season control of aphids and thrips. Some Arizona growers use imidacloprid seed treatments, while other growers use in-furrow treatments of imidacloprid at planting at full label rates. Additional foliar applications of neonicotinoids are used, if needed, later in the season, including products like Assail (acetamiprid), according to one Arizona pest control advisor. There are no reported uses of thiamethoxam on peppers in the past 8 years, though not all applications require reporting (Fournier 2017).

Imidacloprid and thiamethoxam are both critical chemistries for the control of the sugar beet leafhopper (SBLH) in New Mexico pepper production. The SBLH transmits curly top virus, which, if not effectively managed, can have dramatic impacts on yield. Yield losses of up to 30% have been observed, leading to estimated economic losses of $2,300 per acre, according to industry sources. The virus is widespread in arid and semi-arid production regions. Aggressive control of the insect vector (once it is detected, based on scouting) is the best practice for minimizing curly top virus infection rates. Once disease symptoms are apparent in the plants, it is too late for effective control. Resistant varieties are not available for peppers or tomato. Control of nearby host weeds and the vector insect are the primary control measures, and are most effective when implemented on an areawide basis (Goldberg 2001, Koike et al. 2009).

Effective management of sugar beet leafhopper in spring peppers is highly dependent on the systemic action of imidacloprid and thiamethoxam. When leafhoppers feed on infected plants, they will quickly spread the disease as they move from plant to plant through the field. Knock-down materials are ineffective at limiting transmission, because infected hoppers quickly move in from adjacent sites. The systemic action of these neonicotinoid insecticides is highly effective. As hoppers feed on treated plants, they die quickly, preventing further transmission of the virus.

An experienced crop consultant who works with the pepper industry expressed **concern about the Proposed Crop Stage-based application Restrictions for thiamethoxam, which propose to restrict applications after 5 days post-planting or transplanting, regardless of application method.** Currently, growers require 2 applications of either imidacloprid (Admire) or thiamethoxam (Platinum) at full rates to effectively control the vector and limit the spread of curly top virus. Either of these active ingredients is applied at planting as an in-furrow application, and then again sometime between the 2-leaf and 8-leaf stages (6 to 8 weeks), depending on sugar beet leafhopper population levels. **EPA's proposed stage-based restrictions would eliminate this second application, leaving growers with no effective defense against curly top virus**. Although other insecticides are available which may be efficacious against the vector, they are not systemic, and so, are not effective at curtailing the transmission of the disease sufficiently to avoid significant yield losses. We hope EPA will look carefully at this concern as they proceed with registration review.

Other proposed changes impacting peppers, including reduced annual application rates for thiamethoxam are seen as workable within the New Mexico production system, according to an industry consultant.

Pecans
In 2018, Arizona growers harvested 17,000 acres of pecans valued at over $51 million (USDA-NASS 2019). Pecans are the number two economic crop of New Mexico, following hay, with 46,000 acres harvested in 2019 valued at over $170 million (USDA-NASS 2020).

The APMC Pesticide Use Database indicates that thiamethoxam is used in Arizona pecans (Fournier et al. 2017). This use is apparently not common, and we were not able to determine typical crop-stage for these applications. In general, growers try to manage insect pests in a way that has minimal impacts on pollinators or other beneficial insects. Broad-spectrum insecticides are only used as a last resort, and in cases of less common occasional pests that are not on other labels. Pollinators are not particularly drawn to pecans, but growers are mindful of pollinator protection. Foliar applications of insecticides, if needed, are generally early season, pre-bloom applications. Alternatives to neonicotinoids in pecans include flonicamid (Carbine) for aphids, lygus and stink bugs, and sulfoxaflor (Transform) for lygus, which also help to preserve beneficial insects.

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

Davis, R. M., T. A. Turini, B. J. Aegerter, J. J. Stapleton. 2017. UC IPM Pest Management Guidelines: Cucurbits. UC ANR Publication 3445. University of California Agriculture and Natural Resources. http://ipm.ucanr.edu/PMG/r116100211.html

Duval, D., A. Kerna, G. Frisvold, K. Umeda and R. Li. 2016. Contribution of the Golf Industry to the Arizona Economy in 2014. University of Arizona Cooperative Extension. https://cals.arizona.edu/arec/sites/cals.arizona.edu.arec/files/publications/AZ%20Golf%20Economic%20Contribution%202014.pdf

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

Goldberg, N.P. 2001. Curly Top Virus. New Mexico State University Cooperative Extension Service. Guide H-106. http://aces.nmsu.edu/pubs/_h/H106.pdf

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

Killian, M.W. 2016. Arizona Management Plan for the Protection of Pollinators. Arizona Department of Agriculture. https://agriculture.az.gov/sites/default/files/AZ%20MP3%20Edited.pdf

Koike, S.T., R.M. Davis, K.V. Subbarao. 2009. UC IPM Pest Management Guidelines: Peppers. University of California ANR Publication no. 3460. http://ipm.ucanr.edu/PMG/r604100811.html

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

Palumbo, J.C. 2020. Impact of Proposed EPA Label Changes on Neonicotinoid Uses on Produce and Melon Crops in the Desert Southwest, 2018-2019. Vegetable IPM Update, Vol. 10, No. 12. University of Arizona. https://acis.cals.arizona.edu/docs/default-source/agricultural-ipm-documents/vegetable-ipm-updates/2020/200415-impact-of-proposed-epa-label-changes-on-neonicotinoids.pdf?sfvrsn=f6fd9eab_0

USDA NASS. 2018. Arizona Agricultural Statistics 2017. United States Department of Agriculture, National Agricultural Statistics Service. https://www.nass.usda.gov/Statistics_by_State/Arizona/Publications/Annual_Statistical_Bulletin/2017/AZAnnualBulletin2017.pdf

USDA NASS. 2019. Arizona Agricultural Statistics 2018. United States Department of Agriculture, National Agricultural Statistics Service. https://www.nass.usda.gov/Statistics_by_State/Arizona/Publications/Annual_Statistical_Bulletin/2018/AZAnnualBulletin2018.pdf

USDA NASS. 2020. 2019 State Agricultural Overview: New Mexico. United States Department of Agriculture, National Agricultural Statistics Service. https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=NEW%20MEXICO

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/