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November 17, 2016

OPP Docket, Environmental Protection Agency
2822IT 1200 Pennsylvania Ave, NW
Washington, DC 20460

RE: Docket ID No. EPA-HQ-OPP-2011-0667 / EPA-HQ-OPP-2011-0666

To whom it may concern,

I would like to provide comments in regards to the registration status of spinosad and spinetoram developed by Dow AgroSciences LLC. I have been conducting applied research and outreach programs in leafy vegetables and melons for the past 26 years as a Professor of Entomology and Extension Specialist with the University of Arizona at the Yuma Agricultural Center in Yuma, AZ. In my role as vegetable entomologist, I am viewed by growers and pest control advisors (PCAs) in Arizona and southern California as an unbiased, objective source of scientific and technical information on insect pest management (IPM). Since 1993, I have been closely involved in evaluating the efficacy and developing local use patterns for spinosad against a number of key Lepidopterous (Lep) insect pests on leafy vegetables, brassicas and cucurbits. Since 2004, I have been involved in similar research for spinetoram. Based on my field experiences and understanding of their ecological and toxicological profiles, it is my opinion that spinosad and spinetoram are the most valuable insecticide alternatives presently available to organic and conventional vegetable growers in the western U.S. for managing Lep larvae (i.e., beet armyworm, cabbage looper, corn earworm), western flower thrips and *Liriomyza* leafminers.

Arizona and California are the leading producers of leafy vegetables and cole crops in the U.S., and insect management is one of the primary constraints to economic production. Lep larvae and thrips are major pests in these crops and require multiple pesticide applications to prevent losses in yield and quality. On average, growers will apply 5 spray applications (sometimes more under heavy pressure) to control a complex of Lep species, and require at least 3 sprays to control thrips. Although several alternatives are available, the spinosyns have been the most commonly used insecticides for Lep larvae and thrips on Arizona lettuce for the past 12 years. http://cals.arizona.edu/crops/vegetables/advisories/more/insect159.html.
In my view, the reasons growers have become so reliant on spinosad and spinetoram for insect management are several fold.

1) These compounds are consistently efficacious and are reliable in their field performance. Hundreds of efficacy trials conducted on vegetables across the U.S. over the past 20 years with both products demonstrate this. Documentation can easily be found by searching the *Arthropod Management Tests*, and other Entomological Society of American journals. The bottom line: Vegetable growers and PCAs can rely on

spinosad and spinetoram to provide consistent quick knockdown activity and long residual control (14 d) of key Lep and thrips insect pests.

2) Spinosad and spinetoram provide tremendous safety and flexibility in their use because they essentially have no human health concerns. The usage of these reduced-risk compounds significantly reduces health hazards to growers, applicators, PCAs, field workers and consumers. Because lettuce and cole crop production is very labor intensive, this attribute is extremely important for leafy vegetables destined for the fresh market. The production of Leafy vegetables involves significant use of field workers, leading to the potential exposure of laborers to applied insecticides. Field laborers can be found in fields on any given day of the week, performing irrigation, thinning, cultivation, weeding, and harvest activities. Furthermore, PCAs scout fields 4-5 times a week to make insect management decisions. The low REI (4 hr) and PHI (1 d) for spinosad and spinetoram on leafy vegetables allows growers to use these products when needed without disrupting IPM scouting, production or harvest activities.
3) The selective activity of the spinosyn mode of action against insect such as Leps and thrips allows growers to apply the compound on lettuce at any time during the crop season without fear of disrupting natural enemy populations important for keeping secondary pests suppressed.
4) The excellent insect control provided by spinosad and spinetoram is due in part to it translaminar route of action. Translaminar activity is advantageous because it means that the spray coverage of spinosad and spinetoram on crops is less critical than it would be for other insecticides such as pyrethroids, methomyl, acephate, indoxacarb and methoxyfenozide.
5) The spinsosyns play an important role in insecticide resistance management (IRM) of Lepidopterous larvae. Because of its their MOA, spinosad and spinetoram provide growers with an additional MOA with which to rotate throughout the crop season. Our current University of Arizona IRM programs in conventional lettuce for the Lep complex primarily recommends rotations of spinetoram with emamectin benzoate, methoxyfenozide and chlorantraniliprole/cyantraniliprole throughout the crop season. Spinetoram has shown no cross-resistance to the other MOAs used in our cropping system for Lep management, nor has it or any of the other MOA shown any signs of reduced field performance. This IRM approach employing proper MOA rotations, has provided sustained and cost-effective control of the Lep complex on leafy vegetables in AZ and CA for almost 20 years.
6) Availability of spinetoram is even more critical for thrips IRM because of the lack of effective MOA to rotate. Spinetoram is the most efficacious alternative available for thrips control in leafy vegetables, but currently the only other compounds that have shown to be effective against thrips are: methomyl, acephate, and pyrethroids. Without spinetoram, we speculate that thrips populations would rapidly develop resistant to these alternatives. Likewise, without the OPs/Cabamates, resistance to spinetoram would certainly rapidly evolve.
7) Further, without spinosad, production of organic leafy vegetable in the desert would be extremely difficult due to the lack of alternatives that provided comparable activity against Lep larvae and thrips. In fact, protecting crops from these pests is often

challenging with spinosad because of the limited amount of product (29 oz / ac / crop) that can be applied to the crop. The typical rate is 5-8 oz product per acre. IRM in organic production is a large concern due to the lack of effective alternatives for spinosad. The only other reliable alternative for Lep larvae management are the *Bacillus thuringiensis* products; for thrips there are only marginal alternatives (i.e., azadirachtin products and pyrethrins). If growers, had to rely on alternatives other than spinosad, it is highly likely that the acreage of organic leafy vegetable in the desert southwest would significantly decrease.

It is my opinion that without the availability of the unique, effective and environmentally safe insecticide attributes that the spinosyns provide, economic production of both organic and conventional leafy vegetables in Arizona and California would not be sustainable. Active ingredients such as spinosad and spinetoram provide growers with an ideal alternative due to their Ecotox profile, selective activity against key Lep and thrips pests, and their fit in our existing IRM programs. Since the spinosyns were first registered in 1997, along with other reduce-risk compounds that have been registered in the past few years, the reliance of the vegetable industry on organophosphates and carbamates for insect management has declined significantly.

I appreciate the opportunity to weigh in on this important issue and am hopeful that you will consider my comments. If you have any questions concerning my comments, please feel free to contact me.

Thank you.

John C. Palumbo
Professor and Extension Entomologist