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National Organic Standards Board
USDA-AMS-NOP
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Docket ID # AMS-NOP-18-0071-0001

Re. CS: Allyl isothiocyanate

These comments to the National Organic Standards Board (NOSB) on its Spring 2019 agenda are submitted on behalf of Beyond Pesticides. Founded in 1981 as a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to bridge the interests of consumers, farmers, and farmworkers, Beyond Pesticides advances improved protections from pesticides and alternative pest management strategies that reduce or eliminate a reliance on pesticides. Our membership and network span the 50 states and the world.

Beyond Pesticides opposes the inclusion of allyl isothiocyanate (AITC) on the National List because it does not meet any of the criteria in the Organic Foods Production Act (OFPA) for allowing an exemption. It poses environmental and health hazards, is not essential for organic production, and is not compatible with organic practices.

AITC poses hazards to human health and the environment.

The manufacture of AITC involves the use of highly toxic reagents and solvents, and the TR¹ states, “The release of chemical reagents (e.g. allyl iodide and potassium thiocyanate) and highly toxic, flammable and hazardous solvents (e.g. 1,2-dichloroethane) used in the production of AITC due to improper handling/disposal could lead to serious environmental impairments and ecotoxicity in both terrestrial and aquatic environments.”²

The health hazards are documented in the TR and the petition. The TR states, “Considering its moderately high volatility (3.7 mm Hg at 25°C), high application rates (85-340

¹ References in these comments are to the updated (February 12, 2018) TR. Internal citations are omitted.

² TR lines 534-537.

lbs/acre), and agricultural use as a soil fumigant, releases of allyl isothiocyanate into the environment are inevitable. AITC is both flammable and potentially toxic to non-target organisms such as mammals and fish.”³ “Because AITC is a volatile organic compound and has the potential to cause irritation and systemic toxicity, exposure of and potential adverse effects on non-target receptors (humans and wildlife) is likely considering its proposed use pattern as a pre-plant soil biofumigant at the application rates proposed (85–340 lbs/acre).”⁴

The TR says, “One of the degradation products of AITC is carbon disulfide, CS₂ (CDS). There are concerns regarding exposure to CDS because it is listed by the State of California on the Proposition 65 List as a developmental toxicant and is known to induce neuropathological changes and other toxic effects in rodents exposed through inhalation over an intermediate duration of less than one year. . . . Because CDS is a major degradate of AITC, the human and environmental toxicity of CDS should be considered as part of the evaluation of AITC for use in organic crop production.”⁵

According to the TR, “AITC is classified as an eye and skin irritant and is moderately acutely toxic (Category II) to mammals via the oral route of exposure. Data are lacking on inhalation toxicity; however, the structural similarity of AITC to methyl isothiocyanate (MITC; CH₃N=C=S) and known irritant properties of AITC ... would indicate that inhalation toxicity may be a concern.” Even the petitioner’s rebuttal acknowledges that the acute inhalation toxicity is high (lowest adverse effect level = 10 ppm, Category II). Although the petition refers to effects observed in oncogenicity studies, the International Agency for Research on Cancer (IARC) lists AITC in Group 3, “Not classifiable as to its carcinogenicity to humans.”⁶

The greatest health concern, as for all pesticides, is for the applicators and farmworkers who are most heavily exposed. The TR reports on studies of workers exposed to AITC and CDS. These studies found significant reproductive toxicity in both male and female workers, as well as neurological and cardiological effects.⁷

Of great concern is the potential for impact on biodiversity, particularly soil biodiversity that supports organic production. The TR says, “As a potent soil fumigant, AITC is highly toxic to pathogenic soil organisms as well as non-parasitic free-living soil nematodes and symbiotic soil fungi.”⁸ “AITC is also toxic to fungi that produce mutualistic relationships with plants and prey on pest insects. Therefore, non-target plants and beneficial microorganisms would be damaged in treatment plots due [to] AITC drift.”⁹

³ TR lines 523-525.

⁴ TR lines 378-380.

⁵ TR lines 488-495.

⁶ Petition p. 20 and TR lines 670-675.

⁷ TR lines 775-786.

⁸ TR lines 678-680.

⁹ TR lines 687-689.

“AITC emitted from garlic mustard adversely impacts the abundance of entomopathogenic fungi (i.e., fungal parasite of pest insects) in forest soils. These reports provide direct evidence that AITC does not specifically target soil pests; rather, AITC is a broad-spectrum antimicrobial compound that effectively kills both plant pathogens and beneficial soil microorganisms. Additionally, it is known that certain species of soil fungi enhance the bioavailability of organic soil nutrients and mediate the uptake of these nutrients by their mycorrhiza host plants. AITC drift would therefore be problematic for both the beneficial soil fungi and associated plants.”¹⁰

AITC is not essential for organic production.

The TR lists several botanical and microbial products for the management of soil-borne fungal and bacterial pathogens. Organic practices are designed to produce soils that provide healthy growing conditions for crops. Those practices, which encourage beneficial microbes and invertebrates, include: crop rotation, soil nutrient management, and other cultural practices that enhance crop health; introduction and conservation of predators or parasites of pest species; lures, traps and/or repellants; mulching, flaming, mowing, hand or mechanical weeding. The tilling in of mustard plant cover crops to create a green manure is currently being used and could be considered as a viable option.¹¹

AITC is not compatible with organic practices.

It would be difficult to find a practice less compatible with organic production than soil fumigation with a “broad-spectrum antimicrobial compound that effectively kills both plant pathogens and beneficial soil microorganisms.”¹² Organic production uses practices that feed soil organisms who feed crop plants. It creates healthy soil food webs. Using a toxic chemical to wipe out soil biology is the antithesis of organic practices.

Conclusion

We agree with the Crops Subcommittee that the petition to list AITC should be rejected. It is hazardous, not essential for organic production, and incompatible with organic practices.

Thank you for your consideration of these comments.

Sincerely,



Terry Shistar, Ph.D.
Board of Directors

¹⁰ TR lines 601-608.

¹¹ TR lines 886-987.

¹² TR lines 604-605.