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Ms. Michelle Arsenault
National Organic Standards Board
USDA-AMS-NOP
1400 Independence Ave., SW,
Room 2648-S, Mail Stop 0268
Washington, DC 20250-0268

Re. CS: Aluminum sulfate

These comments to the National Organic Standards Board (NOSB) on its Fall 2016 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.

In reviewing this substance, the NOSB must apply the criteria in the Organic Foods Production Act (OFPA), that its use—

- (i) would not be harmful to human health or the environment;
- (ii) is necessary to the production or handling of the agricultural product because of the unavailability of wholly natural substitute products; and
- (iii) is consistent with organic farming and handling.¹

The petition for aluminum sulfate was considered by both the Crops Subcommittee (CS) and the Livestock Subcommittee (LS) because the proposed use is as a litter treatment in poultry houses, which could end up being added to crop fields. The use of aluminum sulfate as petitioned does not meet OFPA criteria of absence of harm to human health and the environment, essentiality, or compatibility with organic production.

Aluminum sulfate poses hazards to human health, agroecosystems, and the environment.

Human health impacts

Aluminum sulfate reacts with water to form sulfuric acid, which is an irritant. Aluminum sulfate is corrosive to the eyes, skin contact causes a rash and burning feeling, and inhalation causes

¹ OFPA §6517(c)(1)(A). Further details at OFPA §6518(m).

throat and lung irritation.² Aluminum is considered an endocrine disruptor by the European Union.³ Subchronic effects of exposure include behavioral deficits, and decreased hemoglobin and hemocrit. Chronic effects include developmental effects (neurobehavioral, inhibition of embryonic development and morphogenetic differentiation, increased dysmorphogenesis), neurotoxicity, and chromosomal aberrations.⁴

Adverse Impacts on the agroecosystem

Considering that its proposed use is in poultry houses, it is noteworthy that it is potentially toxic to poultry by ingestion or dermal exposure.⁵ The growth (body weight) was reduced in chicks exposed for 10 days.⁶

With respect to the use of treated poultry litter on crops, although ammonia loss from poultry litter is reduced by a factor of 3.5 to 20, depending on the rate of aluminum sulfate application,⁷ it significantly reduces the value of poultry litter as a source of phosphorous to crops.⁸ Aluminum hydroxide and phosphates from aluminum sulfate when added to poultry litter applied to soil are persistent due to low solubility.⁹ Litter treated with aluminum sulfate inhibits microbial phosphorous mineralization from organic matter.¹⁰ Aluminum sulfate has been found to be mutagenic in wheat, also reducing its rate of growth. It increased drought stress in soybeans.¹¹

Adverse impacts on the environment

The manufacture of aluminum sulfate begins with the extraction of bauxite ore, which has a deleterious impact on the environment through habitat degradation and fragmentation by roads, and through carbon emissions.¹² Aluminum sulfate is a dry acid, and can create zones of high acidity if accidentally spilled. If the spilled material does not come into contact with moisture, the majority of a spill could be cleaned up before significant acidification occurs, but surfaces of most soils are typically fissured and loose, and sometimes moist, making complete soil cleanup unlikely. Aluminum sulfate is designated as a hazardous substance under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (known as Superfund).¹³ Aluminum hydroxide and phosphates, resulting from aluminum sulfate addition to poultry litter, are persistent in the soil after land application due to low solubility.¹⁴ Aluminum sulfate has been found to reduce growth in ducklings, inhibit the abundance of

² TR lines 544-546.

³ PAN Pesticides Database http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC35278.

⁴ HSDB: Aluminum Sulfate. <http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+5067>.

⁵ TR lines 489-512.

⁶ HSDB: Aluminum Sulfate. <http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+5067>.

⁷ TR lines 455-457.

⁸ TR lines 463-468; Table 2.

⁹ TR lines 380-381.

¹⁰ TR lines 514-515.

¹¹ HSDB: Aluminum Sulfate. <http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+5067>.

¹² TR lines 423-424.

¹³ TR lines 392-398.

¹⁴ TR lines 380-381.

diatoms and cyanobacteria, decrease chlorophyll abundance, and produce toxic effects on zooplankton, fish, and other aquatic animals.¹⁵

Lack of Essentiality: Aluminum sulfate is not essential for organic production.

Like the other litter treatments, the effect lasts 3-4 weeks, so the permanent reduction of ammonia emissions should not be taken as a reason for using aluminum sulfate.¹⁶

The Technical Review (TR) cites some alternative substances. Yucca root, a diet supplement, reduces ammonia production.¹⁷ Clinoptilolite is a naturally-occurring mineral that absorbs ammonia, reducing volatilization.¹⁸ Agricultural lime increases volatilization, and can be used between flocks. It also stabilizes phosphorus.¹⁹

More importantly, aluminum sulfate is used to support a particular type of management, in which “litter is reportedly reused for up to 35 flocks before it is changed,” since typically aluminum sulfate is not applied to fresh litter, but rather to litter that is being re-used for subsequent flocks of birds.²⁰ Since the C:N ratio of poultry litter is already much lower than required by NOP regulations for composting,²¹ the reuse of litter for many flocks only reduces the likelihood that composting will be used to manage manure and amend organic soil. In view of the many benefits of compost for both disposal of manure and growing crops, management systems that discourage composting should not be promoted through the allowance of synthetic inputs.

The TR outlines ways to reduce ammonia in poultry houses without the use of aluminum sulfate. One option is increasing ventilation. Since young birds are susceptible to chilling, young chicks (less than 10 days old) may be housed separately, with low-hung infrared heaters. Assuming decreased ventilation is required to ensure warm temperatures for brooding chicks, starting with fresh litter containing essentially zero ammonia, combined with the comparatively low waste production of chicks (and therefore nitrogen), compared to larger birds, could eliminate the necessity for aluminum sulfate.²² Ventilation can be increased for older birds. Moisture management can be improved by eliminating leaks and spills. Changing litter more often reduces ammonia problems.²³

¹⁵ HSDB: Aluminum Sulfate. <http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+5067>.

¹⁶ TR lines 154-155; 372-374; 440-441.

¹⁷ TR lines 583-587.

¹⁸ TR lines 569-572.

¹⁹ TR lines 574-581.

²⁰ TR lines 609-609.

²¹ Moore, P. A., Daniel, T. C., Sharpley, A. N., & Wood, C. W. (1995). Poultry manure management: Environmentally sound options. *Journal of soil and water conservation*, 50(3), 321-327.

²² TR lines 607-613.

²³ TR lines 592-613.

Lack of Compatibility with an Organic System: Aluminum sulfate is not compatible with organic production.

When applied to agricultural fields, litter treated with aluminum sulfate acts as a synthetic fertilizer.²⁴ The reaction creates ammonium sulfate, which is widely used as a synthetic fertilizer in nonorganic farming.²⁵ The NOSB has recognized this as incompatible with organic systems in the past. Sulfuric acid was petitioned to the in 2005 and again in 2012 , but was rejected, based on the finding that, “Sulfuric acid, when used in livestock manure, is changed to sulfate, which is in this case a synthetically derived plant nutrient.”²⁶

In addition aluminum sulfate inhibits microbial phosphorous mineralization from organic matter²⁷ and inhibits the use of poultry manure in compost.

Conclusion

Because the petitioned use of aluminum sulfate does not meet OFPA criteria of absence of harm to human health and the environment, essentiality, or compatibility with organic production, the petition should be denied, as proposed by the Crops and Livestock Subcommittees.

Thank you for your consideration of these comments.

Sincerely,



Terry Shistar, Ph.D.
Board of Directors

²⁴ TR lines 457-460; 473-474; Table 2.

²⁵ TR lines 158-169.

²⁶ TR lines 311-315. October 2012 NOSB recommendation on sulfuric acid.

²⁷ TR lines 514-515.