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October 11, 2016

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: Copper 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 sunset review covers these listings:
205.601(a)(3) Copper sulfate—for use as an algicide in aquatic rice systems, is limited to one application per field during any 24-month period. Application rates are limited to those which do not increase baseline soil test values for copper over a timeframe agreed upon by the producer and accredited certifying agent.

205.601(e)(4) Copper sulfate—for use as tadpole shrimp control in aquatic rice production, is limited to one application per field during any 24-month period. Application rates are limited to levels which do not increase baseline soil test values for copper over a timeframe agreed upon by the producer and accredited certifying agent.

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

Copper sulfate is hazardous to wildlife and the agroecosystem.

Rice paddies replace natural wetlands and provide alternative habitat for animals threatened by the loss of wetlands. Unfortunately, many of these animals are sensitive to copper. In addition, copper sulfate is toxic to aquatic animals that could provide some biological control for the algae the copper is used to kill. For example, one animal mentioned by the California Rice Commission as an inhabitant of rice fields is the western toad (*Bufo boreas*). Tadpoles of the western toad feed on filamentous algae, detritus, and may even scavenge carrion.[2] The LC50 for tadpoles of *Bufo boreas* is 47.49 parts per *billion* copper (0.04749 ppm).[3] According to the TAP review for copper sulfate (lines 680-683):

> Typical application rates in paddies to control algae appear to range from 0.25 ppm to 2.0 ppm. For treating tadpole shrimp, application rates appear to be "less than 10 ppm". With aquatic organisms showing detrimental effects at levels of about 0.4 ppm and above, this means that the application of CuSO4 to rice paddies could kill mosquito fish, pond snails, and other organisms that could have beneficial properties.

Thus, application rates of copper sulfate exceed levels that are lethal to tadpoles of *Bufo boreas* by up to two orders of magnitude.

Similarly, tadpoles of the Pacific tree frog, another species found in rice fields, are suspension feeders, eating a variety of prey including algae, bacteria, protozoa, and organic and inorganic debris.[4] A third species inhabiting rice fields is the bullfrog, whose tadpoles eat organic debris, algae, plant tissue, suspended matter and small aquatic invertebrates.[5]

In 2001, the NOSB adopted "Principles of Organic Production and Handling." The first of those principles is:

> Organic agriculture is an ecological production management system that promotes and enhances biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. These goals are met, where possible, through the use of cultural, biological, and mechanical methods, as opposed to using synthetic materials to fulfill specific functions within the system.

The particular impacts mentioned above —on amphibians found in rice fields— not only have a negative impact on biodiversity, but they also reduce possibilities for biological control of algae and tadpole shrimp. Thus, the use of copper sulfate in an aquatic environment like a rice field is inconsistent with a system of organic and sustainable agriculture.

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[2] AmphibiaWeb: Information on amphibian biology and conservation. [web application]. 2011. Berkeley, California: AmphibiaWeb. Available: http://amphibiaweb.org/. (Accessed: Jul 25, 2011).

[3] EPA, 2007. *Aquatic Life Ambient Freshwater Criteria—Copper*, Office of Water. EPA-822-R-07-001

[4] http://www.californiaherps.com/frogs/pages/p.regilla.html.

[5] http://www.fs.fed.us/r4/amphibians/bullfrog.htm.

Are copper sulfate products allowed in organic rice production free of arsenic contamination?

The following listings are from the Washington State Department of Agriculture fertilizer database:[6]

Copper Sulfate Listing	Copper Content (%)	Arsenic Content (ppm)
Copper sulfate crystals Product #: 0871-0001	25.0	3
Copper sulfate pentahydrate Product #: 1815-0003	24.3	7.2
Copper sulfate pentahydrate Product #: 1755-0006	25.0	100.0
Copper sulfate pentahydrate granular (organic) Product #: 1665-0018	25.0	10.0

Comparable information does not appear to be available for pesticide products, but the above data should be taken as an indication of the likelihood of arsenic contamination of copper sulfate pesticide products. Rice accumulates arsenic[7] and is the largest non-seafood source of arsenic in the American diet.[8] Organic rice is not immune to accumulating arsenic, and organic brown rice syrup has been identified as a vehicle for contaminating foods, including toddler formula, with arsenic.[9] Although the principal source of the arsenic has been identified as arsenic pesticides formerly used in areas now used for rice production,[10] it would be foolish to add still more arsenic to the water in rice paddies.

What alternative practices would eliminate the need for copper sulfate?

During the last sunset discussion of the use of copper sulfate in rice, the NOSB discussed rice production systems that eliminate the problems that copper sulfate is meant to address, and which cause us to ask, "Are tadpole shrimp and algae 'pests' only because of management practices?" Alternative systems —dryland drilling seed and transplanting seedlings— were documented by both the National Academy of Sciences and ATTRA. The NOSB should have investigated alternative management systems in the intervening years –or commissioned a TR or TAP review to address these systems. This would be a good use of a Technical Advisory Panel –to deliver different viewpoints on organic rice grown under different systems.

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[6] http://agr.wa.gov/pestfert/fertilizers/FertDB/Product1.aspx.

[7] http://www.dartmouth.edu/~toxmetal/research-projects/arsenic-in-plants.html.

[8] Yang, H.-C., Fu, H.-L., Lin, Y.-F., & Rosen, B. P. (2012). Pathways of Arsenic Uptake and Efflux. *Current Topics in Membranes*, *69*, 325–358. http://doi.org/10.1016/B978-0-12-394390-3.00012-4.

[9] Jackson BP, Taylor VF, Karagas MR, Punshon T, Cottingham KL. 2012. Arsenic, Organic Foods, and Brown Rice Syrup. Environ Health Perspect 120:623–626; http://dx.doi.org/10.1289/ehp.1104619.

[10] http://www.consumerreports.org/cro/magazine/2012/11/arsenic-in-your-food/index.htm.

Has the NOSB recommendation for more research been heeded?

The NOSB identified a need for research on the use of copper sulfate in rice at its fall 2011 meeting, saying in the presentation, "Research, this is one area where we have agreement. Everyone believes we need research in this area, and I think there's some analogy here to the antibiotics. This should not be used in aquatic environments." What is the status of research in this area?

A research project on organic rice was announced as "a collaboration between researchers at Texas A&M University's AgriLife Research & Extension Center, Texas A&M Department of Soil and Crop Sciences, USDA's ARS Dale Bumpers National Rice Research Center, University of Arkansas Rice Research and Extension Center, University of Arkansas at Pine Bluff Department of Agriculture, and The Organic Center. It employs a multi-stakeholder research team to develop a multi-disciplinary approach to developing Integrated Pest Management strategies for organic rice production in the Southern United States."[11] Will this project address alternatives to copper sulfate in controlling algae and tadpole shrimp?

The use restrictions in the annotations need to be clarified.

Do growers use the annotations to allow them to use copper sulfate every year –alternating use as algicide with use as insecticide? The annotations should be revised to clarify that use of copper sulfate for <u>any</u> purpose is limited to once in 2 years:

> **205.601(a)(3) Copper sulfate—for use as an algicide in aquatic rice systems, is limited to one application per field <u>for any purpose</u> during any 24-month period. Application rates are limited to those which do not increase baseline soil test values for copper over a timeframe agreed upon by the producer and accredited certifying agent.**
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> **205.601(e)(4) Copper sulfate—for use as tadpole shrimp control in aquatic rice production, is limited to one application per field <u>for any purpose</u> during any 24-month period. Application rates are limited to levels which do not increase baseline soil test values for copper over a timeframe agreed upon by the producer and accredited certifying agent.**

Thank you for your consideration of these comments.

Sincerely,

Terry Shistar, Ph.D.
Board of Directors

[11] https://www.organic-center.org/our-projects/sustainable-and-profitable-strategies-for-ipm-in-southern-organic-rice/