



# BEYOND PESTICIDES

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**Docket ID # AMS-NOP-21-0038**

## **Re. CS: Copper sulfate**

These comments to the National Organic Standards Board (NOSB) on its Fall 2021 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.

**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.**

### **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.<sup>1</sup> The LC50 for tadpoles of *Bufo boreas* is 47.49 parts per billion copper (0.04749 ppm).<sup>2</sup> 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 CuSO<sub>4</sub> 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.<sup>3</sup> A third species inhabiting rice fields is the bullfrog, whose tadpoles eat organic debris, algae, plant tissue, suspended matter and small aquatic invertebrates.<sup>4</sup>

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.

### **Copper sulfate is hazardous to humans.**

Although the CS says, “Copper sulfate has been classified as a human carcinogen by the European Chemicals Agency (ECHA),” it appears that ECHA does not classify it as a human carcinogen, saying, “Available data on the genotoxicity and carcinogenicity of copper and its compounds have been considered against EU classification criteria. The available data for copper compounds do not meet the criteria requiring classification for carcinogenicity.”<sup>5</sup> Nevertheless, copper sulfate is toxic, and workers are particularly at risk.<sup>6</sup> The CS points out a

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<sup>1</sup> [AmphibiaWeb](http://amphibiaweb.org/): Information on amphibian biology and conservation. [web application]. 2011. Berkeley, California: AmphibiaWeb. Available: <http://amphibiaweb.org/>. (Accessed: Jul 25, 2011).

<sup>2</sup> EPA, 2007. *Aquatic Life Ambient Freshwater Criteria—Copper*, Office of Water. EPA-822-R-07-001.

<sup>3</sup> <http://www.californiaherps.com/frogs/pages/p.regilla.html>.

<sup>4</sup> <http://www.fs.fed.us/r4/amphibians/bullfrog.htm>.

<sup>5</sup> <https://echa.europa.eu/registration-dossier/-/registered-dossier/15562/7/8>.

<sup>6</sup> [https://pubchem.ncbi.nlm.nih.gov/source/hsdb/916#section=Non-Human-Toxicity-Excerpts-\(Complete\)](https://pubchem.ncbi.nlm.nih.gov/source/hsdb/916#section=Non-Human-Toxicity-Excerpts-(Complete)).

“specific concern for renal cancers (Buzio et al, 2002).<sup>7</sup> Chronic exposure to fungicidal sprays elevated the risk of renal cancers by almost 3 times.” The Agency for Toxic Substances and Disease Registry (ATSDR) in the U.S. Department of Health and Human Services identifies damage to the gastrointestinal tract, liver, kidneys, and the immune system resulting from inhalation exposure. Respiratory effects have been seen in animals exposed to copper sulfate aerosols (such as might be experienced by workers). “Copper is considered the etiologic agent in the occupational disease referred to as ‘vineyard sprayer’s lung.’”<sup>8</sup> Copper sulfate is also a reproductive toxicant.<sup>9</sup>

### **Some issues need to be addressed by the CS.**

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? We have asked this question over repeated sunset cycles, without getting a clear answer. If copper sulfate is not removed from the National List, the annotations should be revised to clarify that use of copper sulfate for any 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 for any purpose 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 for any purpose 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.**

We have also heard that rice growers may consider algae (aka “scum”) as a disease and use even more copper sulfate, justifying it with the plant disease listing at 205.601(i)(3). This is an obvious abuse that must not be allowed to continue.

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

Copper sulfate is often contaminated with arsenic. For example, the product Ecofusion copper sulfate pentahydrate granular (organic), Product #:1665-0018, is listed by the Washington State Department of Agriculture fertilizer database as containing 25% copper and 10.0 parts per million arsenic.<sup>10</sup>

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<sup>7</sup> Buzio L, Tondel M, De Palma G, et al. (2002) Occupational risk factors for renal cell cancer. An Italian case-control study. *La Medicina del Lavoro*. 93(4):303-309.

<sup>8</sup> ATSDR, 2004. Toxicological Profile for Copper. <https://www.atsdr.cdc.gov/ToxProfiles/tp132.pdf>.

<sup>9</sup> <http://npic.orst.edu/factsheets/archive/cuso4tech.html>.

<sup>10</sup> <https://agr.wa.gov/departments/pesticides-and-fertilizers/fertilizers/fertilizer-database/fertilizer-product-lookup>.

Rice accumulates arsenic<sup>11</sup> and is the largest non-seafood source of arsenic in the American diet.<sup>12</sup> 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.<sup>13</sup> Although the principal source of the arsenic has been identified as arsenic pesticides formerly used in areas now used for rice production,<sup>14</sup> it would be foolish to add still more arsenic to the water in rice paddies.

#### Is sodium carbonate peroxyhydrate an effective alternative?

Sodium carbonate peroxyhydrate (SCP) was added to the National List with the stipulation that it would reduce the use of copper sulfate as an algicide. Has it proved to be effective? If so, can the listing for copper sulfate as an algicide be eliminated? If not, then SCP should be removed from the National List.

#### What alternative practices would eliminate the need for copper sulfate?

During the 2011 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 Sustainable Agriculture Program. The NOSB should have investigated alternative management systems in the intervening years—or commissioned a Technical Review (TR) or Technical Advisory Panel (TAP) review to address these systems. This would be a good use of a TAP—to deliver different viewpoints on organic rice grown under different systems.

#### Has the NOSB recommendation for more research been heeded?

The NOSB addressed 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

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<sup>11</sup> <http://www.dartmouth.edu/~toxmetal/research-projects/arsenic-in-plants.html>.

<sup>12</sup> 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>.

<sup>13</sup> 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>.

<sup>14</sup> <http://www.consumerreports.org/cro/magazine/2012/11/arsenic-in-your-food/index.htm>.

research team to develop a multi-disciplinary approach to developing Integrated Pest Management strategies for organic rice production in the Southern United States.”<sup>15</sup> *Has this project addressed alternatives to copper sulfate in controlling algae and tadpole shrimp? With what results?*

Data on accumulation in the soil, as required by the annotation, should be provided to the CS and the public.

The annotations on both listings for copper sulfate state, “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.” Those who certify organic rice producers should be, therefore, obtaining test results for copper. As we have urged, these test results should have been requested by the CS and provided to the public—listings may remain anonymous—prior to the Fall 2021 meeting.

### **Copper sulfate should be sunsetted from organic rice production.**

The annotation—which recognizes the toxicity of copper in the soil—is one indicator that copper sulfate should not remain on the National List forever. Even more important are the data on ecotoxicity and carcinogenicity presented above. The toxic effects on the aquatic and semi-aquatic organisms who inhabit rice paddies as a substitute for natural wetlands make copper sulfate incompatible with organic production and unacceptable to organic consumers. It is time to eliminate this toxic chemical from organic production.

Thank you for your consideration of these comments.

Sincerely,



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<sup>15</sup> <https://www.organic-center.org/our-projects/sustainable-and-profitable-strategies-for-ipm-in-southern-organic-rice/>.