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

Re. CS: 2018 Sunset

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

Copper sulfate

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.

A note: The link in the posting goes to the wrong copper sulfate recommendation. The correct link is to the fall 2013 recommendation.

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 that 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.[1] The LC50 for tadpoles of *Bufo boreas* is 47.49 parts per *billion* copper (0.04749 ppm).[2] 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 $CuSO_4$ 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.[3] A third species inhabiting rice fields is the bullfrog, whose tadpoles eat organic debris, algae, plant tissue, suspended matter and small aquatic invertebrates. [4]

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.

The CS has decided not to ask for another technical review, but there are some issues that need to be addressed by the CS:

1. **Do growers use the annotations to allow them to use copper sulfate every year – alternating its use as an algicide with use as an insecticide?**
2. **Are copper sulfate products allowed in organic rice production free of arsenic contamination?**

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[1] AmphibiaWeb: Information on amphibian biology and conservation. [web application]. 2011. Berkeley, California: AmphibiaWeb. Available: http://amphibiaweb.org/. (Accessed: Jul 25, 2011).
[2] EPA, 2007. *Aquatic Life Ambient Freshwater Criteria—Copper*, Office of Water. EPA-822-R-07-001.
[3] http://www.californiaherps.com/frogs/pages/p.regilla.html.
[4] http://www.fs.fed.us/r4/amphibians/bullfrog.htm.

The following listings are from the Washington State Department of Agriculture fertilizer database:[5]

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

Rice accumulates arsenic[6] and is the largest non-seafood source of arsenic in the American diet.[7] 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.[8] Although the principal source of the arsenic has been identified as arsenic pesticides formerly used in areas now used for rice production,[9] it would be foolish to add still more arsenic to the water in rice paddies.

3. 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 (National Sustainable Agriculture Information Service). 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.

4. **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?

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

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

[7] 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.

[8] 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.

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

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."[10] Will this project address alternatives to copper sulfate in controlling algae and tadpole shrimp?

Ozone gas

205.601(a)(5) Ozone gas—for use as an irrigation system cleaner only.

Ozone has high acute toxicity. Concentrations above 0.1 mg/L by volume average over an eight hour period may cause nausea, chest pain, reduced visual acuity and pulmonary edema. Inhalation of >20 ppm for at least an hour may be fatal. In terms of chronic effects, ozone may have deleterious effects on the lungs and cause respiratory disease.[11] The use of ozone may be seriously detrimental to the health of humans who work with it, and those exposed indirectly, downwind of exposure. The use of a known and problematic air pollutant could make its consideration as a tool in organic farming questionable.[12]

Also see our comments on hypochlorous acid. The NOSB needs to take a comprehensive look at all sanitizers, their needs, and evaluate whether all needs can be met with materials that have low impacts on human health and the environment. The TR on nutrient vitamins and minerals illustrates the possibility that a technical review could contain such a comprehensive review.

In view of the dangers associated with the use of ozone, the Crops Subcommittee should ask:

1. **Does the use of ozone in organic crop production pose a hazard for workers?**
2. **Would restrictions on the use of ozone help protect workers?**

Peracetic acid

205.601(a)(6) Peracetic acid—for use in disinfecting equipment, seed, and asexually propagated planting material. Also permitted in hydrogen peroxide formulations as allowed in §205.601(a) at concentration of no more than 6% as indicated on the pesticide product label.
205.601(i)(8) Peracetic acid—for use to control fire blight bacteria. Also permitted in hydrogen peroxide formulations as allowed in §205.601(i) at concentration of no more than 6% as indicated on the pesticide product label.

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[10] https://www.organic-center.org/our-projects/sustainable-and-profitable-strategies-for-ipm-in-southern-organic-rice/.
[11] TAP, lines 296-299. August 14, 2002.
[12] TAP lines 695-697.

Information from recent EPA reviews has not been incorporated into recent decisions about peracetic acid. The current annotation seems to indicate that peracetic acid is an "inert" ingredient, but it is not listed in EPA's InertFinder database.

EPA has efficacy data for peracetic acid products that indicate strong effectiveness on hard surfaces.[13] This makes us question the need for chlorine compounds.

In 2009, EPA opened a registration review docket and published a preliminary work plan for peroxy compounds. In March 2010, EPA issued a final work plan that described potential health and environmental risks and identified data needs. In December 2011, the agency issued a Data Call-in, which was withdrawn and reissued in February 2012, imposing new data requirements for human toxicity, ecotoxicity, environmental fate, and occupational exposure. In November 2013, EPA recognized the Peroxy Compounds Task Force (PCTF), composed of registrants and potential registrants of peroxy compound products, as a data submitter for these materials.[14]

In its summary of human health effects data for the peroxy compounds, EPA finds:

> High concentrations of peroxy compounds [including peracetic acid and hydrogen peroxide] are … corrosive and can be acutely toxic and/or extremely irritating to the lungs and skin.[15]

EPA will be developing occupational inhalation risk assessments based on anticipated data. The American Conference of Governmental Industrial Hygienists (ACGIH) has set new occupational exposure limits for peracetic acid.[16] The National Advisory Committee for Acute Exposure Guideline Levels for Hazardous Substances (NAC/AEGL Committee) has established even more stringent limits.[17] A review by scientists from Ecolab, a member of the PCTF and manufacturer of peracetic acid products, has come up with similar limits.[18] The review also stated:

> Overall, there are notable deficiencies in the PAA toxicological dataset, particularly in regards to information gaps concerning chronic toxicity (e.g., carcinogenicity, mutagenicity/genotoxicity, reproductive/developmental toxicity, repeat-dose toxicity) and the fact that a large number of toxicity studies did not follow conventional testing methodology. However, the available in vivo and human experience data indicate that

[13] http://iaspub.epa.gov/apex/pesticides/f?p=CHEMICALSEARCH:7:::NO:1,3,31,7,12,25:P3_XCHEMICAL_ID:2278
[14] http://www.epa.gov/sites/production/files/2014-04/documents/pr2013-2.pdf
[15] Summary of Human Health Effects Data for the Peroxy Compounds Registration Review Decision Document. http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2009-0546-0003
[16] http://potentcompoundsafety.com/2014/02/acgih-occupational-exposure-limit-peracetic-acid.html
[17] National Research Council (US) Committee on Acute Exposure Guideline Levels. Acute Exposure Guideline Levels for Selected Airborne Chemicals: Volume 8. Washington (DC): National Academies Press (US); 2010. 7, Peracetic Acid Acute Exposure Guideline Levels. Available from: http://www.ncbi.nlm.nih.gov/books/NBK220001/
[18] Pechacek, N., Osorio, M., Caudill, J., & Peterson, B. (2015). Evaluation of the toxicity data for peracetic acid in deriving occupational exposure limits: A minireview. *Toxicology letters*, *233*(1), 45-57.

> sensory irritation appears to be the most sensitive health endpoint and protecting against this endpoint should adequately mitigate risk from other potential effects.[19]

A new technical review was published after the CS completed its sunset review document. It reveals that there are several distinct substances called "peracetic acid," and that not all are permitted under NOP regulations.[20]

Also see our comments on hypochlorous acid. The NOSB needs to take a comprehensive look at all sanitizers, their needs, and evaluate whether all needs can be met with materials that have low impacts on human health and the environment. The TR on nutrient vitamins and minerals illustrates the possibility of such a comprehensive review.

Questions regarding peracetic acid:

1. **Does the annotation need to be changed to reflect information in the TR that not all substances identified as "peracetic acid" are permitted under NOP regulations?**
2. **Is there new information about occupational hazards that should be taken into account in the sunset decision and/or in formulating an additional annotation?**
3. **Can peracetic acid be used for fireblight without harm to soil and workers?**
4. **Is peracetic acid effective for all uses of chlorine? If peracetic acid remains on the National List, can chlorine be eliminated from use in organic production?**

EPA List 3 - Inerts of Unknown Toxicity

205.601(m) (2) EPA List 3—Inerts of unknown toxicity—for use only in passive pheromone dispensers.
See separate comments on "inerts."

Calcium chloride

205.602(c) Calcium chloride, brine process is natural and prohibited for use except as a foliar spray to treat a physiological disorder associated with calcium uptake.

The sunset is for prohibition as a nonsynthetic, but it is still relevant that the rule states in section 205.601(j):
"(6) Micronutrients—not to be used as a defoliant, herbicide, or desiccant. Those made from nitrates or chlorides are not allowed. Soil deficiency must be documented by testing."

The TAP review was done in 2001. Summary (lines 14-17):

> All the reviewers concluded that the material is inappropriate for soil application given the high chloride content and high solubility. Two of the three reviewers would prohibit

[19] Pechacek, N., Osorio, M., Caudill, J., & Peterson, B. (2015). Evaluation of the toxicity data for peracetic acid in deriving occupational exposure limits: A minireview. *Toxicology letters*, *233*(1), 45-57.
[20] 2016 Peracetic Acid TR Crops. Lines 236-260 and Table 5.

all production uses except for foliar applications to correct nutritional deficiencies. All three reviewers agree that natural sources of food-grade calcium chloride should be allowed as a postharvest dip. One would support adding synthetic food-grade sources to the National List for postharvest treatment.

TAP reviewer 2 (lines 423-425):

I don’t see supporting evidence that this is entirely compatible. It appears that one of the reasons that Ca is deficient in the organs of certain fruits is that breeds of crops have been introduce to maximize fruit yield. If the deficiency is dependent on variety of fruit, would it behoove us to promote the use of varieties that do not exhibit the deficiencies?

Questions:

1. **Is there any evidence that the prohibition is inappropriate?**
2. **What are the alternatives to the use "as a foliar spray to treat a physiological disorder associated with calcium uptake”?**

Thank you for your consideration of these comments.

Sincerely,

Teresa Ann Shistar

Terry Shistar, Ph.D.
Board of Directors