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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: 2019 Sunset of §601 Materials

These comments to the National Organic Standards Board (NOSB) on its Spring 2017 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.

Below are comments on materials due to sunset from §205.601 in 2019, with the exception of biodegradable biobased mulch film and chlorine materials, which will be dealt with in separate comments.

Biodegradable biobased mulch film

See separate comments.

Boric acid

205.601(e) As insecticides (including acaricides or mite control). (3) Boric acid - structural pest control, no direct contact with organic food or crops.

Although boric acid has long been considered a "least-toxic" pesticide when placed in traps as non-volatile bait or gel formulations that eliminate direct exposure, its use as a dust in structures can result in exposure and hazards for exposed people. There are alternative materials and practices that may be less harmful.

Environmental and Health Hazards

Boric acid is harmful to humans and the environment. It is a reproductive toxicant, a suspected endocrine disruptor, and toxic to plants and animals. Borax mining results in environmental damage.[1]

Inhalation exposure from mining exposure has been documented to cause respiratory irritation such as dryness of the mouth, nose, or throat, dry cough, nose bleeds, and sore throat.[2] Reduction in sperm production has been found in both humans and experimental animals.[3] Other reproductive effects that have been documented include reduced success of pregnancy, reduced birth weight, and birth defects.[4] Consistent with its effects on sperm, boric acid has been shown to reduce testosterone levels.[5]

Essentiality

Boric acid is not essential. Natural alternatives include diatomaceous earth[6] and boiling water.[7] Management practices include sanitation, exclusion, sticky barriers, sticky traps[8] and removal of host plants for aphids.[9]

Compatibility

As an unnecessary toxic synthetic input with nontoxic alternatives, boric acid is not compatible with organic production practices.

Conclusion

With the challenging issues of health and environmental/mining impacts and available alternative materials and practices that may be less harmful, if boric acid remains on the National List, it should be further annotated, "for use only as bait in traps or in gel formulations." Since the NOP has allowed a number of annotation proposals to go forward in tandem with sunset proposals, we suggest that we suggest that the sunset motion be considered with an annotation motion.

[1] "How Green are Boron Cleansers?" Scientific American, 2009. http://www.scientificamerican.com/article/how-green-are-boron-cleansers/

[2] Agency for Toxic Substances and Disease Registry (ATSDR), 2010. Toxicological Profile for Boron.

[3] Agency for Toxic Substances and Disease Registry (ATSDR), 2010. Toxicological Profile for Boron.

[4] Agency for Toxic Substances and Disease Registry (ATSDR), 2010. Toxicological Profile for Boron. Caroline Cox, 2004. Pesticide Factsheet: Boric Acid and Borates. https://d3n8a8pro7vhmx.cloudfront.net/ncap/pages/26/attachments/original/1428423318/boricacid.pdf?1428423318.

[5] Caroline Cox, 2004. Pesticide Factsheet: Boric Acid and Borates. https://d3n8a8pro7vhmx.cloudfront.net/ncap/pages/26/attachments/original/1428423318/boricacid.pdf?1428423318.

[6] TAP, p. 10.

[7] Beyond Pesticides, ManageSafe: Ants. http://www.beyondpesticides.org/resources/managesafe/choose-a-pest?pestid=7. Northwest Coalition for Alternatives to Pesticides (NCAP), Ants. https://d3n8a8pro7vhmx.cloudfront.net/ncap/pages/45/attachments/original/1428428614/ants.pdf?1428428614

[8] TAP, p. 10.

[9] Beyond Pesticides, ManageSafe: Ants. http://www.beyondpesticides.org/resources/managesafe/choose-a-pest?pestid=7. Northwest Coalition for Alternatives to Pesticides (NCAP), Ants. https://d3n8a8pro7vhmx.cloudfront.net/ncap/pages/45/attachments/original/1428428614/ants.pdf?1428428614

Chlorine Materials: Calcium hypochlorite, Chlorine dioxide, Sodium hypochlorite

See separate comments.

Copper sulfate and Coppers, fixed

§205.601(i) As plant disease control.

(2) Coppers, fixed—copper hydroxide, copper oxide, copper oxychloride, includes products exempted from EPA tolerance, *Provided,* That, copper-based materials must be used in a manner that minimizes accumulation in the soil and shall not be used as herbicides.

§205.601(i) As plant disease control.

(3) Copper sulfate—Substance must be used in a manner that minimizes accumulation of copper in the soil.

Beyond Pesticides does not propose the delisting of coppers. These comments point out the need for careful review of specific use patterns, which requires information about how these products are actually used by organic growers.

The conditions requiring the use of coppers must be reviewed.

OFPA requires that materials on the National List be itemized "by specific use or application."

Copper is viewed as an essential tool in organic agriculture by many who practice organic farming. Although there are many documented environmental and health impacts of copper products, the environmental impacts vary not only with use, but with soil type. There are many soils that are low in copper, and an increase that results from the pesticidal use of copper may be beneficial in those cases. However, compatibility with sustainable agriculture is a criterion for organic materials review, and European vineyards attest to the impacts of copper after 100 years of application.[10] Critics of organic production point to the allowed use of copper

[10] 2011 Copper Sulfate and Other Copper Products Technical Review, lines 535-537. "Vineyard soils in Europe, which have seen intensive use of copper sulfate containing Bordeaux mixtures for 100 years, have concentrations ranging from 100-1,500 mg/kg in soil (Besnard et al., 2001)."

products as "proof" that organic methods are no less hazardous than nonorganic, chemical-intensive methods.[11]

Fungicides are among the most hazardous of all pesticides in terms of human toxicity. Many are carcinogenic. Copper-based fungicides are less hazardous than most, and organic farmers challenged by diseases often consider them essential. However, organic farmers who do rely on copper materials do so without a specific listing of the allowed uses, as is required by OFPA.[12] The NOSB is limited in its ability to evaluate the health and environmental impacts of copper, with its range of use patterns, or its essentiality, given specific needs and alternative practices or materials. Without a firm foundation for NOSB decisions, the National Organic Program (NOP) cannot ensure that uses of copper (i) meet the standards of OFPA in protecting the health of workers, consumers, and the ecosystem, and (ii) are based on data or information that supports claims of essentiality.

Copper products are toxic and persistent.

Copper compounds are toxic, and this particularly poses risks to workers. Toxicity is described in the 2001 TAP lines 144-191,

> Acute toxicity: The oral LD50 of copper is 472 mg/kg in rats. Copper sulfate is caustic and acute toxicity is largely due to this property. The lowest dose of copper sulfate that has been toxic when ingested by humans is 11 mg/kg. Ingestion of copper sulfate is often not toxic because vomiting is automatically triggered by its irritating effect on the gastrointestinal tract. Symptoms are severe, however, if copper sulfate is retained in the stomach, as in the unconscious victim. . . Copper sulfate can be corrosive to the skin and eyes. It is readily absorbed through the skin and can produce a burning pain, as well as the other symptoms of poisoning resulting from ingestion. Examination of copper sulfate-poisoned animals showed signs of acute toxicity in the spleen, liver, and kidneys.

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[11] See, for example: Christie Wilcox, 2011. Mythbusting 101: Organic Farming > Conventional Agriculture. http://blogs.scientificamerican.com/science-sushi/2011/07/18/mythbusting-101-organic-farming-conventional-agriculture/.

Steve Savage. An Unlikely Pair: "Heavy Metal" and "Organic Produce" http://redgreenandblue.org/2010/09/27/an-unlikely-pair-heavy-metal-and-organic-produce/.

David Derbyshire, 2008. "Thousands of tons of organic food produced using toxic chemicals," http://www.dailymail.co.uk/news/article-505427/Thousands-tons-organic-food-produced-using-toxic-chemicals.html.

Rob Johnston, 2008. "The great organic myths: Why organic foods are an indulgence the world can't afford" http://www.independent.co.uk/environment/green-living/the-great-organic-myths-why-organic-foods-are-an-indulgence-the-world-cant-afford-818585.html.

Fox News, 2008. "Organic Food Offers Little More Than Peace of Mind, Critics Say," http://www.foxnews.com/story/2008/10/04/organic-food-offers-little-more-than-peace-mind-critics-sa-346245969/.

In its publication "Criticisms and Frequent Misconceptions about Organic Agriculture: The Counter-Arguments," IFOAM (International Federation of Organic Agriculture Movements), includes "Misconception Number 7: Organic farming uses pesticides that damage the environment: natural pesticides are more dangerous than conventional pesticides because they are less efficient and therefore require the application of huge quantities. This is also true for fungicide (e.g., organic grape producers contaminate the soils with large quantities of copper because they are not allowed to use modern fungicides). In addition, some organic pesticides are as poisonous as synthetic ones (e.g., nicotine and pyrethrum)." http://infohub.ifoam.org/sites/default/files/page/files/misconceptions_compiled.pdf.

[12] OFPA §6517(b) The list established under subsection (a) of this section shall contain an itemization, by specific use or application, of each synthetic substance permitted under subsection (c)(1) of this section or each natural substance prohibited under subsection (c)(2) of this section.

Injury may also occur to the brain, liver, kidneys, and gastrointestinal tract in response to overexposure to this material. Some of the signs of poisoning that occurred after 1-12 g of copper sulfate was swallowed include: a metallic taste in the mouth, burning pain in the chest and abdomen, intense nausea, repeated vomiting, diarrhea, headache, sweating, shock, and discontinued urination leading to yellowing of the skin. Injury to the brain, liver, kidneys, stomach, and intestinal linings may also occur in copper sulfate poisoning. It is readily absorbed through the skin and will give the above symptoms. Contact with skin causes burns and also acts as a sensitizer. Later exposure can cause allergic reactions (Kamrin 1997; Extoxnet).

Chronic toxicity: Vineyard sprayers experienced liver disease after 3 to 15 years of exposure to copper sulfate solution in Bordeaux mixture. Long-term effects are more likely in individuals with Wilson's disease, a condition that causes excessive absorption and storage of copper. Chronic exposure to low levels of copper can lead to anemia. The growth of rats was retarded when given dietary doses of 25 mg/kg/day of copper sulfate. Dietary doses of 200 mg/kg/day caused starvation and death. Sheep given oral doses of 20 mg/kg/day showed blood cell and kidney damage. They also showed an absence of appetite, anemia, and degenerative changes.

Reproductive effects: Copper sulfate has been shown to cause reproductive effects in test animals. Reproduction and fertility was affected in pregnant rats given this material on day 3 of pregnancy.

Teratogenic effects: There is very limited evidence about the teratogenic effects of copper sulfate; unlikely to be teratogenic in humans at expected exposure levels.

Mutagenic effects: Copper sulfate may cause mutagenic effects at high doses. At 400 and 1000 ppm, copper sulfate caused mutations in two types of microorganisms. Such effects are not expected in humans under normal conditions.

Considered an experimental equivocal tumorigenic agent (NTP, 2001). It has systemic and gastrointestinal effects in humans. HIGH via intraperitoneal route. MODERATE via oral and inhalation routes.

Carcinogenic effects: Copper sulfate at 10 mg/kg/day caused endocrine tumors in chickens given the material parenterally, that is, outside of the gastrointestinal tract through an intravenous or intramuscular injection. However, the relevance of these results to mammals, including humans, is not known (Extoxnet 1996).

Organ toxicity: Long-term animal studies indicate that the testes and endocrine glands have been affected.

Fate in humans and animals: Absorption of copper sulfate into the blood occurs primarily under the acidic conditions of the stomach. The mucous membrane lining of the intestines acts as a barrier to absorption of ingested copper. After ingestion, more than 99% of copper is excreted in the feces. However, residual copper is an essential trace element that is strongly bioaccumulated. It is stored primarily in the liver, brain, heart, kidney, and muscles.

Persistence is described in the 2001 TAP lines 210-220,
Environmental Fate: Breakdown in soil and groundwater: Since copper is an element it will persist indefinitely. Copper is bound, or adsorbed, to organic materials, and to clay and mineral surfaces. The degree of adsorption to soils depends on the acidity or alkalinity of the soil. Because copper sulfate is highly water soluble, it is considered one of the more mobile metals in soils. However, because of its binding capacity, its leaching potential is low in all but sandy soils. When applied with irrigation water, copper sulfate does not accumulate in the surrounding soils. Some (60%) is deposited in the sediments at the bottom of the irrigation ditch, where it becomes adsorbed to clay, mineral, and organic particles. Copper compounds also settle out of solution. (Kamrin, 1997)

Breakdown in water: As an element, copper can persist indefinitely. However, it will bind to water particulates and sediment (Extoxnet, 1996).

The 2011 TR lines 512-537 says,
Copper is a metal that has a potential to build up and decrease the productivity, filtering capacity, and buffering capacity of soil (Andreu and Gimeno-Garcia, 1999). This may be more of a concern in fragile ecosystems such as marsh or wetlands than rice crops. When metals such as copper are applied to the soil they may: (a) remain in soil solution and run off in drainage water, (b) be taken up by plants, or (c) be retained by soil in soluble or insoluble forms. In a system that is seasonally wet and dry, there is continuous change in the availability of metals due to cycles of aerobic and anaerobic conditions affecting the soil redox potential. This may make such soils more vulnerable to enhanced solubility and toxicity of metals (Andreu and Gimeno-Garcia, 1999). Of the metals, copper is relatively more mobile (extractable) than cadmium, lead, zinc, nickel, or cobalt, but even so is retained in the soil for very long time periods. In a study that sampled the same site over a five-year period in a rice growing region of Spain, it was found that copper does, however, gradually decrease over time, unlike cadmium that has shown a tendency to increase (Andreu and Gimeno-Garcia, 1999). Copper is found in the upper levels of the soil profile, and decreases with depth.

Factors Affecting Copper in Soil

Copper in a specific location greatly depends on the bedrock composition, weathering extent, and agricultural operations (crop rotation, fertilizer application, pesticide application, irrigation, crop harvest, etc). Copper levels in soils studied in Italy were found to be closely correlated to agricultural use (Facchinelli et al., 2000). An application of 10 lb A-1 of copper sulfate pentahydrate, which is 25% copper as the active ingredient, would add 2.5 lb A-1 of copper (Besnard et al., 2001; Gimeno-Garcia et al., 1996). Grape producers may apply 3-10 application per year of Bordeaux mix. Vineyard soils in Europe, which have seen intensive use of copper sulfate containing Bordeaux mixtures for 100 years, have concentrations ranging from 100-1,500 mg/kg in soil (Besnard et al., 2001).

Copper products create environmental hazards in both use and manufacture.

The 2001 TAP lines 238-240 says,

> Copper mining and refining cause pollution through runoff from spoils and emissions associated from acid rain. Production of copper sulfate recycles water used in the crystallization vats and wastewater is limited to some sludge form the softening process plus boiler blowdown (Sittig, 1980).

Reviewer #1 in the 2001 TAP lines 376-379 said, "From 1987 to 1993, about 450 million pounds of copper were released to the environment in the U.S., mainly through copper smelting operations. About 1.5 million pounds were released into water from various industrial operations (EPA, 2001). So it looks like the probability of environmental contamination from copper mining and smelting is high."

And at lines 222-230 the 2001 TAP says,

> One of the limiting factors in the use of copper compounds is their serious potential for phytotoxicity. Copper sulfate can kill plants by disrupting photosynthesis. Blue-green algae in some copper sulfate treated Minnesota lakes became increasingly resistant to the algacide after 26 years of use (Extoxnet, Kamrin, 1997). Copper is more available for plant uptake from soil when soil is acidic. Toxic plant levels could be reached at soil levels of 25-140 ppm in acidic mineral soils. It is less available in soils rich in organic matter. Levels in soil with high organic matter could reach 1000 ppm before phytotoxicity would occur (Erich 1994). In Europe, general cropland has 5- 30 mg Cu/kg soil, and vineyards in Europe 100 to 1500 mg Cu/kg soil (Besnard 1). Each addition of 10 lbs/acre of copper sulfate could increase the concentration in the top 2 inches of soil by 6 mg/kg or 6 ppm.

The 2011 TR lines 606-612 says,

> The event of fish kills in New York was reported by Preddice (2009) in the New York State Department of Environmental Conservation. The event occurred in the Hoosic River of Rensselaer County, New York, in 2001. Over one million of fish were killed by acidic copper sulfate solution. Details were not given in the report. According to a local newspaper, about 2,000 gallons of acidic copper sulfate, used to electroplate circuit boards, was accidentally spilled from a storage building at the Oak-Mitsui plant into the Hoosic River before 3:30 am, June 28, 2001. A seven-mile stretch of the river was contaminated. Most of the aquatic life, including brown and rainbow trout, was killed (Albany Times Union, 2001).

And lines 620-621, "A 23-page review on the effect of copper on freshwater food chains and salmon was given by Woody (2007)."[13]

In 2011, the NOSB recommendation emphasized the requirement to minimize soil accumulation, coming close to requiring frequent testing, "Good management practices require close monitoring to ensure that there is no accumulation in the soil."

Copper products are hazardous to humans, particularly workers.

As documented by the quotations from the TAP and TR above, copper causes a wide range of toxicological effects. The 2001 TAP line 243 says, "Direct hazards to applicators are the major concern." In 2011, the NOSB demonstrated concern over worker protection by including language in the narrative portion of the recommendation:

> The Committee will work with the National Organic Program to advance guidance that ensures that organic operations are strictly meeting, and to the extent possible, exceeding the standards established by the product label in meeting principles of sustainability and a sustainable work environment for all those who work in organic production.

<u>This never happened</u>. Since the NOP has not taken action to advance such guidance and has taken action to limit NOSB workplans to the consideration of petitions for and reviews of National List materials, we ask that the NOSB recommend the inclusion of language to protect workers in the listings for copper products. According to EPA, "The WPS (Worker Protection Standard) requires that owners and employers on agricultural establishments provide protections to workers and handlers from potential pesticide exposure, train them about pesticide safety, and provide mitigations in case exposures may occur." Since copper products may be the most hazardous materials for workers used in organic production, this is an appropriate place to stress the importance of appropriate Personal Protective Equipment and compliance with EPA's Worker Protection Standard. We suggest this worker protection annotation, "Steps to meet worker protection standards must be documented in the Organic System Plan."

Copper products cannot be properly evaluated without enumerating their uses.

OFPA §6517(b) says, "The list established under subsection (a) of this section shall contain an itemization, by specific use or application, of each synthetic substance permitted under subsection (c)(1) of this section or each natural substance prohibited under subsection (c)(2) of this section." Copper products provide a perfect example of why OFPA requires this itemized list. It is not so much that any one use fails OFPA criteria, but that the <u>sum of all uses</u> may. In order to be able to ensure that the use of copper materials in organic production is limited to that which is necessary and does not harm humans or the environment –and to reassure the public of those facts– the NOSB must solicit input on uses of copper products in organic production and annotate the listings.

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[13] Woody CA. 2007. Copper – Effects on freshwater food chains and salmon: A review. Fisheries Research and Consulting. http://www.fish4thefuture.com/pdfs/Woody_Copper_Effects_to_Fish%20-%20FINAL2007.pdf

In 2015, the Center for Food Safety specifically asked that these salient issues be investigated and researched:

- A comprehensive systems management-based approach to organic disease and lessening the need for copper use on a crop-by-crop basis;
- Breeding plants that are resistant to the types of diseases for which copper is used---induced resistance;
- Developing alternative formulations of pesticides and fungicides, such as smaller particles (not engineered nano products) of copper that facilitate coverage and thereby reduce the amount of copper that needs to be applied;
- Assessing existing cultural practices such as crop rotations, sanitation practices, and the timing of irrigation relative to the climatic conditions in which the copper is being used to make crops less prone to disease;
- Evaluating nutrition and soil fertility management approaches to mitigate the impacts of plant diseases on organic crops such as the use of plant extracts, beneficial microbes, and a host of other emerging tools and materials;
- Determining more efficient methods for spreading copper on leaf or flower; and
- Identifying the copper products that contain the least amount of elemental copper and investigating ways to reduce the amount of elemental copper in all products.

Conclusion

The NOSB must not let another sunset review of copper materials pass without taking steps to comply with §6517(b). It must start by requesting a Technical Review to enumerate and evaluate needs for copper materials in organic production. Since past actions by the NOSB have not been effective in initiating NOP action, we ask the board to attach an expiration date to the listings for fixed coppers and copper sulfate. The NOSB and those reliant on copper should note that the process we are recommending is just that –a process. It is critical for organic integrity and public trust in organic production methods to follow the law, past Board reviews and requests for action and follow-through, and create a full public record that ensures the public that all materials are subject to full and thorough review. This is what distinguishes organic from chemical-intensive practices.

Since copper products are among the most hazardous materials for workers used in organic production, and one that generates significant criticism of organic production, this is an appropriate place to stress the importance of appropriate Personal Protective Equipment and compliance with EPA's Worker Protection Standard. We suggest this worker protection annotation, "Steps to meet worker protection standards must be documented in the Organic System Plan."

Since the NOP has allowed a number of annotation proposals to go forward in tandem with sunset proposals, we suggest that the sunset motion be considered with an annotation motion.

Humic acids

205.601(j) As plant or soil amendments (3). Humic acids - naturally occurring deposits, water and alkali extracts only.

Synthetic humic acids (those on the National List) do not meet the criteria under OFPA. They present environmental hazards in extraction, are not essential, and are not compatible with organic production.

The extraction/manufacture of humic acids has negative impacts on human health and the environment.

Synthetic humic acids are derived from low grade coal, usually obtained by surface mining, which causes widespread damage to the air, land, and water. In addition, exposure to people living in areas where lignite is mined, through dust or water pollution is relevant given the connection, noted in the Technical Review for oxidized lignite and humic acid derivatives (TR), between lignite exposure and kidney failure and renal cancer.[14]

Humic acids are not essential for organic production.

Natural humic acids are produced by the decomposition of organic material. As noted in the TR, "Compost, cover crops, manure, mulch, and other natural sources of organic matter can all increase humic acid content of the soil."[15]

Humic acids are not compatible with organic production.

As mentioned in the TR, "Humic acid derivatives, including oxidized lignite, do not explicitly fall into any of the categories for production found in 7 USC 6517(c)(1)(B)(ii)."[16] Therefore, they (including the alkali-derived humic acids) are not eligible for listing on the National List. In addition, it is profoundly contrary to organic principles to use a fossil-fuel-derived substance as a substitute for such fundamental organic practices as the use of compost, cover crops, manure and organic mulch.

Conclusion

In the fall of 2012, the NOSB denied the petition for oxidized lignite, saying that humic acids derived from coal by oxidation with hydrogen peroxide should not be listed because of environmental and health impacts, lack of essentiality, and incompatibility with organic production. The same reasoning could be applied to humic acids derived from coal by treatment with alkali, and humic acids should be delisted.

In addition, it is disturbing to read some of the comments reported by Organic Trade Association in response to its 2015 survey that indicate to us that this synthetic material is routinely used. Reliance on a synthetic soil amendment for soil fertility is not compatible with organic production processes. Synthetic humic acid may play a role in the transition to organic, but is incompatible with organic practices and should not be used on certified

[14] TR lines 319-323.
[15] TR lines 491-498.
[16] TR lines 236-237.

organic farms. An annotation to the effect that "humic acid may be used in the transition to organic if accompanied by a plan for building soil that provides adequate nutrition through soil-building practices and organic inputs" would be acceptable. If the NOSB chooses this option, then we suggest that we suggest that the sunset motion be considered with an annotation motion.

Micronutrients: Soluble boron products, Sulfates, carbonates, oxides, or silicates of zinc, copper, iron, manganese, molybdenum, selenium, and cobalt

205.601(j) As plant or soil amendments. (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.
(i) Soluble boron products
(ii) Sulfates, carbonates, oxides, or silicates of zinc, copper, iron, manganese, molybdenum, selenium, and cobalt

In 2015, the NOSB voted to replace the wording "Soil deficiency must be documented by testing" with "Deficiency must be documented." The regulation has not been changed to reflect that recommendation.

This listing covers a number of materials, and the coverage by the existing technical review is uneven, with much attention to nickel, not covered by this listing. It does not address the manufacturing (mining) impacts of these materials at all. We offer some comments below, but suggest that the Crops Subcommittee address each micronutrient, looking at manufacturing impacts, essentiality, and compatibility of each.

Synthetic micronutrients pose hazards for humans and the environment.

Agricultural use is a source of contamination by some metals, like copper[17] and selenium.[18] Micronutrients are generally applied as complexes with a chelating agent. Some synthetic chelating agents such as ETDA may cause the loss of other components in soil by complexing those components and making those components soluble in water.[19] The uptake of some micronutrients may be suppressed by the excess of others.[20] The toxic effect of one may be enhanced by another.[21] Some forms may bind to soil, and others may be more soluble and leach into water. "Once metals are introduced and contaminate the environment, they will remain. Metals do not degrade like carbon-based (organic) molecules. The only exceptions are mercury and selenium, which can be transformed and volatilized by microorganisms. However, in general it is very difficult to eliminate metals from the environment."[22]

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[17] ATSDR, Toxicological Profile for Copper. P. 123. http://www.atsdr.cdc.gov/ToxProfiles/tp132.pdf
[18] http://en.wikipedia.org/wiki/Selenium_pollution.
[19] TR lines 484-487.
[20] TR lines 513-514.
[21] TR line 521.
[22] USDA-NRCS, Heavy Metal Soil Contamination, p. 3. ftp://ftp-fc.sc.egov.usda.gov/IL/urbanmnl/appendix/u03.pdf

The source of most micronutrients is mining. The environmental impact of mining includes erosion, formation of sinkholes, loss of biodiversity, and contamination of soil, groundwater, surface water by chemicals from mining processes.[23] "[C]ommercial micronutrients are generally manufactured as by-products or intermediate products of metal mining and processing industries."[24] "The production for sulfidic zinc ores produces large amounts of sulfur dioxide and cadmium vapor. Smelter slag and other residues of process also contain significant amounts of heavy metals."[25] "The major sources of release [of copper] are mining operations, agriculture, sludge from publicly-owned treatment works (POTWs) and municipal and industrial solid waste."[26] Iron mining has been identified as a source of water and air pollution.[27] Manganese has been identified in at least 869 of the 1,699 hazardous waste sites that have been proposed for inclusion on the EPA National Priorities List.[28] Molybdenum occurs in natural waters and may be present in concentrations of several hundred micrograms per liter or higher in ground and surface water near mining operations or ore deposits.[29] "Sources of [selenium] pollution include waste materials from certain mining, agricultural, petrochemical, and industrial manufacturing operations."[30] Areas around cobalt mining operations contain hundreds to thousands times the concentration of cobalt that are found in most soils.[31] Borax mining degrades the landscape, pollutes air and water, and requires large inputs of energy and water.[32]

These are heavy metals and are toxic in large amounts.[33] Heavy metals disrupt metabolic functions in two ways: (1) They accumulate and thereby disrupt function in vital organs and glands such as the heart, brain, kidneys, bone, liver, etc. (2) They displace the vital nutritional minerals from their original place, thereby hindering their biological function. It is, however, impossible to live in an environment free of heavy metals. There are many ways by which these toxins can be introduced into the body such as consumption of foods, beverages, skin exposure, and the inhaled air.[34] Boric acid is a reproductive toxicant and suspected

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[23] http://en.wikipedia.org/wiki/Environmental_impact_of_mining.
[24] TR lines 323-324.
[25] http://en.wikipedia.org/wiki/Zinc.
[26] ATSDR, Toxicological Profile for Copper. P. 123. http://www.atsdr.cdc.gov/ToxProfiles/tp132.pdf
[27] Cory McDonald1, Brandy Baker-Muhich, Tom Fitz, Paul Garrison, Jordan Petchenik, Paul Rasmussen, Robert Thiboldeaux, William Walker, and Carl Watras, 2013. Taconite Mining in Wisconsin: A Review. http://media.jrn.com/documents/Iron-Mining-Review-011014.pdf.
[28] ATSDR, Toxicological Profile for Manganese, p. 403. http://www.atsdr.cdc.gov/ToxProfiles/tp151.pdf.
[29] EPA Region 6, ATSDR and CDC Health Effects and Toxicological Profiles. http://www.epa.gov/region6/6sf/newmexico/homestake_mining/appendix-d.pdf.
[30] http://en.wikipedia.org/wiki/Selenium_pollution.
[31] ATSDR, Public Health Statement for Cobalt. http://www.atsdr.cdc.gov/phs/phs.asp?id=371&tid=64.
[32] "How Green are Boron Cleansers?" Scientific American, 2009. http://www.scientificamerican.com/article/how-green-are-boron-cleansers/.
[33] TR lines 489-491.
[34] Singh, R., Gautam, N., Mishra, A., & Gupta, R. (2011). Heavy metals and living systems: An overview. *Indian Journal of Pharmacology*, *43*(3), 246–253. doi:10.4103/0253-7613.81505. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3113373/.

endocrine disruptor.[35] Use of these materials as micronutrients may result in inhalation exposure, and risk levels may not be known for such exposures.[36]

Synthetic micronutrients may not be needed.

Other sources of micronutrients include naturally occurring minerals, which may require weathering or biological action to release nutrients.[37] "Metal-accumulator plants may be grown on some metal-rich soil and the harvest may be used as nutrient source for different locations. This might provide a slow-releasing source of nutrients in a long term, but may not be a quick remediation for nutrient deficiency problems."[38] Other practices that can eliminate the need for micronutrients include pH adjustment, balancing nutrients, use of manure, crop rotations, and use of accumulators.[39]

The use of synthetic micronutrients is incompatible with organic production.

In an organic system, nutrients are provided by the soil, and the farmer feeds the soil natural organic and mineral materials. If synthetic micronutrients are to be used at all, it must be as an exception and in concert with soil building practices that restore the mineral balance naturally.

Conclusion

The Crops Subcommittee must bring to the NOSB a proposal that is based on examining all of the allowed synthetic micronutrients and their chelating agents in light of OFPA criteria. Beyond Pesticides suggests that an annotation be added: "Soil deficiency must be demonstrated by verifiable site-specific documentation that is accompanied by a plan for building soil that provides adequate nutrition through soil-building practices and organic inputs." Since the NOP has allowed a number of annotation proposals to go forward in tandem with sunset proposals, we suggest that the sunset motion be considered with an annotation motion.

Soaps, herbicidal

Current listing:
§205.601 (b) As herbicides, weed barriers, as applicable.
(1) Herbicides, soap-based—for use in farmstead maintenance (roadways, ditches, right of ways, building perimeters) and ornamental crops.

The supportive materials on this substance leave questions unanswered. The original TAP review appears to have considered only potassium-based soaps, but the more recent TR considers both potassium- and ammonium-based soaps. Yet ammonium-based soaps seem to be limited to another use altogether by §205.601(d) "As animal repellents—Soaps,

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[35] NCAP factsheet, Boric Acid. http://www.pesticide.org/get-the-facts/pesticide-factsheets/factsheets/boricacid.
[36] See for example, ATSDR, Toxicological Profile for Copper. P. 16. http://www.atsdr.cdc.gov/ToxProfiles/tp132.pdf
.[37] TR lines 376-420.
[38] TR lines 876-878.
[39] TR lines 876-878; 941-974.

ammonium—for use as a large animal repellant only, no contact with soil or edible portion of crop."

Herbicidal soaps do not meet any of the three OFPA criteria of absence of harm to humans and the environment, essentiality, and compatibility with organic practices.

Herbicidal soaps are inconsistent with organic practices.

Herbicidal soaps are non-selective synthetic herbicides. The NOSB has generally found synthetic herbicides to be incompatible with organic practices. Indeed, their use is inconsistent with the first "principle of organic production and handling" adopted by the NOSB:

> 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.[40]

Herbicidal soaps harm the ecosystem.

The Technical Review (TR) finds a possibility of damage to, and bioconcentration by, aquatic organisms if the soaps are applied to water. They may harm many soil-dwelling organisms including insects, earthworms, and nematodes that are supportive of organic production. The annotation restricts its use to non-crop areas, but these areas should be sources of biodiversity that support the farm.

Herbicidal soaps are not essential.

The TR and earlier TAP review list several natural materials that can be used instead of herbicidal soaps, including vinegar, citric acid, essential oils, corn gluten meal, mulches, and hot water. Alternative practices include mulching, mowing, grazing, hand/mechanical cultivation, and use of flame or other sources of heat.

Conclusion

Herbicidal soaps should be allowed to sunset because they do not meet the criteria for listing on the National List.

Sticky traps/barriers

205.601(e)(9) - As insecticides (including acaricides or mite control).

This listing covers a wide range of traps and coatings made with a number of different materials. Some are coated paper, some are coated plastic, and some are a sticky chemical that is brushed on plants. Coated plastic, at least, produces plastic waste that goes to the landfill. The sticky coating may contain petroleum distillates, and the traps may contain volatile attractants. Most are non-specific and kill non-target insects, spiders, mites, reptiles, and

[40] NOSB Principles of Organic Production and Handling, adopted October 17, 2001.

amphibians. One TAP reviewer suggested the traps are compatible with organic only in processing plants.[41] Another suggested they should be used only for monitoring or mass trapping.[42] Some sticky traps can result in much suffering by animals caught in them.

Conclusion

Like a number of other materials used for insect control, sticky traps suffer from the shortcoming of having the potential to kill non-target organisms. Many can be used in such a way that the likelihood of trapping non-target animals is low. The CS should explore the possibility of an annotation that ensures the targeted use of these traps, such as "Must be used in a way that prevents the capture of non-target animals." Since the NOP has allowed a number of annotation proposals to go forward in tandem with sunset proposals, we suggest that the sunset motion be considered with an annotation motion.

Vitamins B1, C, E

205.601(j)(8) - As plant or soil amendments.

According to the 1995 TAP review, the antioxidant vitamins C and E are used as foliar sprays and dips for pest control. Vitamin B1 is used to stimulate rooting in cutting. The available documentation does not provide support for this listing in reference to OFPA criteria, except to state that they break down quickly and are non-toxic to plants and humans in the amounts used.

Synthetic vitamins B1, C, and E are incompatible with organic production.

The available documentation does not state the purpose of applying vitamins C and E to plants. However, the literature shows that the use is as a plant growth promoter.[43] The TAP review stated that vitamin B1 is used to stimulate rooting in cuttings. Synthetic growth promoters and growth hormones are not compatible with organic production. The technical review for indole-3-butyric acid (IBA) lists a large number of natural materials and other methods for rooting plants. As mentioned in the technical review for aqueous potassium silicate, silicates can play a plant-protective role and can be increased in plants through the use of silica-rich plants in compost and careful recycling of compost and manure. Organic practices such as variety selection, soilscape, sanitation, crop rotation, and mulches all contribute to disease resistance.

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[41] TAP, pp. 5-6; 9.

[42] TAP, p. 3.

[43] Ibrahim, Z. R. (2013). Effect of Foliar Spray of Ascorbic Acid, Zn, Seaweed Extracts (Sea) Force and Biofertilizers (EM-1) on Vegetative Growth and Root Growth of Olive (Olea Europaea L.) Transplants cv. HojBlanca. *Int. J. Pure Appl. Sci. Technol*, *17*(2), 79-89. "[There is a widespread use of antioxidants especially ascorbic acid for enhancing the growth and productivity of fruit trees." Nour, K. A. M; Mansour, N. T. S. and Eisa G. S.A., 2012.
Effect of Some Antioxidants on Some Physiological and Anatomical Characters of Snap Bean Plants under Sandy Soil Conditions. New York Science Journal 5(5):1- 9. Vitamin E had a significant effect on number of leaves/plant, total dry weight/plant, plant height, number of leaves and dry weight/plant.

2015 Technical Review

A new TR was produced since the CS performed its summary of vitamins B1, C, and E for the spring 2015 meeting. The TR states that fermentation using genetically engineered organisms may be used to produce all three vitamins.[44]

The TR states that vitamin B1 appears to be ineffective for its use as a root growth stimulator[45] and lists a number of alternative materials and practices, including "encouraging the health of existing soil fungi and supplementing soils with exogenous sources of beneficial fungi that release plant nutrients and growth factors to the soil may naturally stimulate root growth in transplanted crops."[46] With regard to vitamins C and E, the TR states, "No natural substances were identified as alternatives for the antioxidants vitamins C and E in organic crop production. However, the utility of external sources of these substances is uncertain due to the paucity of literature describing practical applications of these substances in agricultural settings."[47] The TR also says "horticultural crops grown under lower nitrogen supply and less frequent irrigation may be preferred due to the high concentrations of vitamin C and low concentrations of nitrate."[48]

Conclusion

Beyond Pesticides supports the sunsetting of vitamins B1, C, and E in crop production. The vitamins may be produced by genetically engineered organisms, and the TR finds them ineffective for the purposes for which they are used, listing alternative substances for vitamin B1 and alternative practices for all three.

Thank you for your consideration of these comments.

Sincerely,

Terry Shistar, Ph.D.
Board of Directors

[44] Lines 348-390.
[45] Lines 108-111; 208.
[46] Lines 649-692.
[47] Lines 693-695.
[48] Lines 759-760.