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Docket # AMS-NOP-22-0071

Re. CS: 2025 Sunset

These comments to the National Organic Standards Board (NOSB) on its Fall 2018 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.

The Organic Foods Production Act requires that substances be listed on the National List “by specific use or application.” Some of these listings in §601 do not meet this requirement. We request that all listings be annotated with the specific use or application.

Alcohols: Ethanol Isopropanol

205.601 (a) As algicide, disinfectants, and sanitizer, including irrigation system cleaning systems.

(1) Alcohols.

(i) Ethanol. As algicide, disinfectants, and sanitizer, including irrigation system cleaning systems.

(ii) Isopropanol. As algicide, disinfectants, and sanitizer, including irrigation system cleaning systems.

Ethanol

Ethanol may be manufactured from ethylene or by fermentation. The usual feedstock for fermentation is corn, so the use of genetic engineering is an issue. Ethylene is a hazardous gas. Hazards from the use of ethanol are low. Nonsynthetic ethanol, essential oils, and heat treatment are alternatives, as well as preventive management.

Ethanol is approved for use of EPA’s Design for the Environment label for sanitizers.

Isopropanol

Isopropanol is volatile and likely to escape to the environment, but its toxicity is low, and it is readily biodegradable. Nonsynthetic ethanol, essential oils, and heat treatment are alternatives, as well as preventive management. Isopropyl alcohol can also be produced by fermentation.

Alternative practices include heat treatment of tools, pruning in hot, dry conditions, and preventive landscape conditions. Natural alternatives are identified in the checklist: nonsynthetic ethanol, nonsynthetic organic acids (acetic, citric, lactic), antiseptic essential oils. Examples of the strongest and most commonly used antiseptic essential oils include clove oil, melaleuca oil, and oregano oil. In addition, pine oil, basil oil, cinnamon oil, eucalyptus oil, helichrysum oil, lemon and lime oils, peppermint oil, tea tree oil, and thyme oil. Aloe vera contains six antiseptic agents (lupeol, salicylic acid, urea nitrogen cinnamonic acid, phenols and sulfur) with inhibitory action on fungi, bacteria and viruses. The efficacy of essential oils for this use is unclear. In addition, other synthetic materials on the National List include: chlorine materials, hydrogen peroxide, peracetic acid, and soaps. Isopropanol is listed for use by EPA's Design for the Environment [now Safer Chemical Program] label for sanitizers.

Conclusion

The NOSB should investigate the availability organic and/or nonsynthetic alcohols from non-GMO fermentation organisms and feedstock. Findings on this issue are necessary to support a proposal to relist, and Beyond Pesticides supports the CS proposal to relist ethanol and isopropanol only if that evidence is presented.

Sodium carbonate peroxyhydrate

205.601 (a) As algicide, disinfectants, and sanitizer, including irrigation system cleaning systems.

(8) Sodium carbonate peroxyhydrate (CAS #-15630-89-4)—Federal law restricts the use of this substance in food crop production to approved food uses identified on the product label.

The Organic Foods Production Act requires that substances be listed on the National List "by specific use or application." This listing in §601 does not meet this requirement. We request that all listings be annotated with the specific use or application.

Beyond Pesticides opposes the relisting of sodium carbonate peroxyhydrate (SCP) as an algicide unless the NOSB documents evidence that it is effective for its intended use. The annotation limiting its use to approved uses on the product label arose out of a concern that its use in food crops might not be allowed by EPA. EPA has since clarified the use.¹ Regardless, the annotation should refer to the registered, or allowed, use of SCP in organic production, since use contrary to the product label would not be allowed by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) or the Organic Foods Production Act (OFPA).

¹ 2014 TR, Lines 111-124.

SCP was added to the National List as an alternative to copper sulfate in rice, which we would support, but there is no evidence that it has been adopted or is effective for that use.

The 2014 technical review clarified some issues (line numbers in 2014 TR):

1. Undissolved SCP is toxic to birds when ingested and SCP is highly toxic to bees (lines 404-407);
2. There are several alternative materials and a number of alternative practices that can be used to control algae in rice (lines 436-528);
3. Because most natural waters have a high buffering capacity, the likelihood of a large environmental shift in pH as a result of the introduction of sodium carbonate peroxyhydrate is remote (lines 274-276); and
4. SCP is not permitted in organic production internationally (lines 164-202).

In addition, the Crops Subcommittee pointed out in 2018 that algae may be managed by managing phosphorus fertilization.

An important issue that needs to be addressed is whether SCP can be a replacement for copper sulfate. The comments that were posted regarding this during the last sunset of copper sulfate suggest that it cannot.

In addition, as stated in the TR, SCP does not fall in a category of exemptions allowed under OFPA and is hence not compatible with organic practices.

The NOSB recommended that Confidential Business Information (CBI) claims no longer be accepted in petitions. New materials petitions would be at a disadvantage under this policy, in having to disclose information not disclosed by previous petitioners. In the interest of fairness, therefore, materials should not be relisted during the sunset process unless the CBI claimed in the original petition is disclosed. In the case of sodium carbonate peroxyhydrate, the petitioner claimed as CBI sections of the petition including “part of the lab test results or portions of the BRAD for Sodium carbonate peroxyhydrate that mention the test results and/or MRID numbers that correspond to specific tests.”

This data should be disclosed, and it should be disclosed in a manner that allows public comment on it to be considered “timely.” Furthermore, since the BRAD (Biopesticides Registration Action Document) is a public document, at least part of the petitioner’s claim was improper.

Because of the incompatibility with organic practices and the lack of information on the efficacy of SCP and its substitutability for copper sulfate, we oppose the relisting of SCP. If relisted the listing should be annotated to read, “(8) Sodium carbonate peroxyhydrate (CAS #-15630-89-4), until [5 years from relisting]” to ensure that it is delisted if adequate evidence is not presented. It should be annotated by the specific use, as required by OFPA.

Newspaper or other recycled paper

205.601(b) As herbicides, weed barriers, as applicable. (2) Mulches. (i) newspapers or other recycled paper, without glossy or colored inks.

205.601(c) - As compost feedstocks - Newspapers or other recycled paper, without glossy or colored inks.

Newspaper or other recycled paper without glossy or colored inks is listed at 7 CFR 205.601(b) as mulch and 205.601(c) as a compost feedstock. In 2017, the NOSB requested a TR to examine the current status of paper that might be used in organic production, particularly because of the now common use of colored inks in newspaper and the shift to soy-based inks. The Crops Subcommittee received the TR in 2017, and here we address issues from the perspective of information in that TR.

Is the current annotation still necessary?

Yes. Although there is a movement toward elimination of the worst of the heavy metals in colored inks (lead and cadmium), it is not complete, and the substitutes are not non-toxic. Although the 2017 TR says, “No human health risks were identified from the various glosses, coatings and laminates that are applied to ‘glossy’ paper, either as a primary risk through direct ingestion or as a secondary risk through the soil,” these materials include toxic chemicals, including acrylonitrile, polyethylene (LDPE), styrene, butadiene, vinyl acetate, and polyvinyl chloride (PVC). Acrylonitrile is “highly poisonous” and classified by EPA as a probable human carcinogen (B1).² Styrene is a neurotoxin,³ and the National Toxicology Program (NTP) rates styrene as “reasonably anticipated to be a human carcinogen.”⁴ Butadiene is considered genotoxic, and the NTP considers 1,3-butadiene to be a known human carcinogen, with exposure is highly correlated with incidence of leukemia.⁵ Vinyl acetate and its metabolite acetaldehyde are genotoxic in human cells in vitro and on animals in vivo. It is considered a possible human carcinogen.⁶ PVC is made from vinyl chloride and contains phthalates. Dioxins are released from PVC during manufacture or landfilling. Vinyl chloride is considered a human carcinogen by NTP. Phthalates and dioxins are carcinogens and endocrine disruptors.⁷

Inks

“Colored ink has a different composition from black ink, and it is more highly variable. As previous technical reviews noted, formulations vary widely.” (2017 TR lines 146-147.)

“Various elemental ‘heavy metal’ compounds are used as pigments in certain colored inks. The compound of greatest toxicological concern has been lead chromate (PbCrO₄) or ‘chrome yellow’ (U.S. NLM 2016). Another ink ingredient of toxicological concern is cadmium sulfide (CdS), also known as ‘cadmium yellow’. Mercury is also used for a variety of pigments in inks, in particular mercuric sulfide (HgS) used for red pigmentation. Other elemental based

² <https://pubchem.ncbi.nlm.nih.gov/compound/acrylonitrile>.

³ <https://www.atsdr.cdc.gov/phs/phs.asp?id=419&tid=74>.

⁴ <https://ntp.niehs.nih.gov/ntp/roc/content/profiles/styrene.pdf>.

⁵ <https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/f?./temp/~zDKVWB:1>.

⁶ <https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/f?./temp/~ytZAUJ:1>.

⁷ https://toxtown.nlm.nih.gov/text_version/chemicals.php?id=84.

pigments include cobalt blue (CoAl_2O_4), chrome green (Cr_2O_3), molybdate orange ($\text{Pb}(\text{CrMoS})\text{O}_4$), Paris green ($\text{Cu}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{Cu}(\text{AsO}_2)_2$), and Prussian blue ($\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$.” (2017 TR lines 152-158.)

“The use of heavy metal-based pigments has been reduced due to environmental and health concerns, but they remain in use for certain print applications. On the other hand, the use of colored ink in newspaper printing has increased. Many colored inks are proprietary formulations and some specific compositions are highly guarded trade secrets. Because of the proprietary nature of ink formulations, it is not possible to say how widely each formulation is used, although as hazardous substances they would presumably be reported on the individual ink’s Safety Data Sheets (SDSs).” (2017 TR lines 162-167.)

Inks, including black inks and soy inks, contain compounds that persist in the environment. Heavy metals used in colored inks do not decompose. “While most inks do not contain heavy metals, some do. Because ink formulations are often proprietary and are highly variable, heavy metal content of printed paper can be determined only by analytical methods. Some states have regulations that limit the consolidated total metal content of lead, chromium, mercury and cadmium in a finished package to 100 parts per million (ppm). These regulations are aimed at protecting the environment during the disposal of post-consumer waste. Chlorinated yellow dyes are also non-biodegradable.” (2017 TR, lines 475-484.)

“Some of the alternatives to metal based dyes—such as azo- and anthraquinone-based dyes—are considered possible carcinogens. During the 1990s in the UK, the trend was for lead, mercury and cadmium in colored newsprint to decrease below the detection limit. On the other hand, the increased use of colored ink in newsprint leads to an increase in elemental barium (Ba) and copper (Cu).” (2017 TR, lines 505-510.)

“USDA’s Natural Resource Conservation Service (NRCS) recommends, ‘Only use newspaper text pages (black ink); color dyes may be harmful to soil microflora and fauna if composted and used.’ Azo dyes, which have been developed as alternatives to some of the metal-based dyes, are biodegradable by several species of bacteria. However, chlorinated yellow dyes are non-biodegradable.” (2017 TR lines 614-618.)

“Inks, coatings and other paper additives are documented to have environmental impacts. The Coalition of Northeastern Governors (CONEG) regarded the heavy metals in packaging to pose hazards to public health and safety, and to the environment. Paper products make up the largest part of this stream. To address this problem, CONEG prepared draft model legislation that limited the amounts of cadmium, lead, mercury, and hexavalent chromium in packaging. Nineteen states have adopted laws that limit these toxic substances in packaging.⁸

The U.S. and some other countries have banned lead and hexavalent chromium from pigments in food grade packaging, but not other uses. Not all countries –e.g., South Korea and China—have eliminated these metals. (2017 TR, lines 676-686.)

⁸ <https://toxicsinpackaging.org/>

Colored toners may also contain heavy metals. “These patents disclosed over 100 different dyes and pigments that could be used. The formulations of the pigments were not fully disclosed in the patents. Many were azo- or anthraquinone-based, and a number included different metallic agents, including cadmium, chromium and copper.” (2017 TR lines 173-176.)

Glossy paper ingredients

In addition to nonsynthetics used as fillers in glossy paper, synthetic chemicals may also be used. “Various petrochemical polymers, such as acrylonitrile, polyethylene (LDPE), styrene, butadiene, vinyl acetate, and polyvinyl chloride may also be used to create a glossy finish. Various resins are used to laminate the gloss and bind the polymer to the paper surface.” (2017 TR lines 182-185.) LDPE and paraffin would not significantly degrade in soil. (2017 TR lines 499-500.)

“No human health risks were identified from the various glosses, coatings and laminates that are applied to ‘glossy’ paper, either as a primary risk through direct ingestion or as a secondary risk through the soil.” (2017 TR, lines 688-689.)

Are there problems with paper that is allowed under the current annotation?

Food packaging is identified in the 2017 TR as possibly containing hazardous materials. Bisphenol A (BPA) may be used in newspapers. All inks contain persistent chemicals. Black inks may contain toxic solvents, and it is not clear whether soy-based inks contain those same solvents. There are some unanswered questions.

Paper additives

“The prevalent reactant acid used in thermal paper is bisphenol A (BPA). BPA is also used in flyers, magazines, newspapers, napkins, paper towels, toilet paper and paper cups.” (2017 TR lines 61-63.) “With the growing concerns about endocrine disruption related to BPA, its low dose toxicity, and the way it can enter the bloodstream through the skin, efforts are underway to find suitable replacements. Two are bisphenol F (BPF) and bisphenol S (BPS). These analogs of BPA appear to have in vitro estrogenic activity similar to BPA.” (2017 TR lines 512-515.)

“Traditional paper processing has used gelatin as an additive since the 14th century CE, and “papermakers’ alum,” or aluminum sulfate, since the 17th century CE. Various fillers have been used nearly as long. Modern paper products also use a wide variety of synthetic polymers and co-polymers that change the functionality and performance of the paper compared with simple cellulose-starch blends. Aluminum foil and paraffin waxes are added to paper and paperboard used in food packaging.” (2017 TR lines 49-54.)

Black inks.

“Black inks are composed primarily of oils, which may be of petroleum or vegetable origins, and carbon black, which is mostly produced from petroleum. Most modern newspaper inks or ‘news blacks’ are produced from naphthenic petroleum oils. The next most prevalent ingredient is carbon black, which is also primarily a petroleum derivative. Carbon black may also

be produced from coal tar and may use rubber from recycled tires and recovered plastics. A number of solvents are used in commercial inks, including toluene, xylene, methyl chloroform, methyl isobutyl ketone, and hexane. Because of environmental considerations, these solvents are being replaced with water-based inks. While these inks have reduced solvents to less than 1% of the formulation, they are not solvent-free. Prior to the development of fossil fuels, ancient black inks about 4,500 years ago were made from animal or vegetable charcoal mixed with glue. Charred animal and vegetable material may make up a small fraction of current production of carbon black, but this is exceptional and not the industry norm.” (2017 TR, lines 133-144.)

Inks, including black inks and soy inks, contain compounds that persist in the environment. (2017 TR, lines 475-477.)

Adhesives (2017 TR, lines 188-203)

Various paper products have adhesives, including glues and starches derived from animals and plants. “Modern adhesives are mostly petroleum derivatives.” (2017 TR, line 190.) Adhesives in corrugated cardboard “may include formaldehyde, urea, melamine, and starch based resins.” (2017 TR, lines 191-192.) A wide variety of consumer and office products use various glues and adhesives. The TR says most adhesives are proprietary, but include polyvinyl alcohol, ethylene vinyl acetate, polyolefin, polyamide-based adhesives.

Waxes, Resins, and Polymers (2017 TR, lines 188-203)

Paper and cardboard may also be covered with waxes (mostly paraffins), resins (derived from pine tar, coal tar, or heavy crude petroleum), or polymers (including polyethylene, polyacrylimides and polyesters.)

Other ingredients

Paper may also contain chlorine compounds from bleaching (2017 TR line 437-438), chelating agents such as ethylene diamine tetraacetic acid (EDTA), diethylene pentamine tetraacetic acid (DPTA), and sodium silicate (2017 TR lines 445-446), surfactants used to detach the inks from the fibers (2017 TR lines 447-448), enzymes used to promote de-inking (2017 TR line 448). A by-product of de-inking is a sludge that may contain inks, pigments, fibers, fillers, adhesives and coating compounds. (2017 TR line 453.) “The USDA is actively supporting the advancement of cellulose nanotechnology,” which can be used to create paper. (2017 TR lines 462-464.)

Source issues

GMO trees

“[G]enetically modified trees have been developed and may be used for paper production. The traits for which trees are being genetically modified include reduced lignin, higher cellulose content, fiber structure that is more easily pulped by enzymatic action, insect and disease resistance, and rapid growth, among other traits. China began commercial plantings of genetically modified trees in 2002. The U.S. has permitted plantings of genetically modified papaya and one plum variety, but not commonly pulped species. Commercialization of genetically modified forest trees has faced challenges in the U.S. and elsewhere for reasons

such as inadequate financial returns on investment, government regulation that limit plantings, and lack of public acceptance.” (2017 TR lines 69-78.)

Recycled content

In general, there has been an upward trend in the percentage of paper made from recycled sources. Paper produced in the United States is estimated to be between one-third to almost one-half recycled content. The United States recovers and recycles a lower percentage of paper than other countries. In 2002, the United States used about 41% recycled paper in its manufacturing. (2017 TR lines 80-84.)

“Recovered paper can come from a number of different sources, and may be made into a variety of products based on the grade. The U.S. EPA recognizes five basic paper grade categories: old corrugated containers, mixed paper, old newspapers, high grade de-inked paper, and pulp substitutes. These five major categories are further segmented by sources, uses, and levels of contaminants. The Institute of Scrap Recycling Industries (ISRI) recognizes over 50 grades of scrap paper.” (2017 TR lines 92-96.)

“Paper and paper manufacturing by-products that are unsuitable for recycling are more likely to be used as compost feedstock and mulch than higher grade recovered paper that can be used to make paper. In general, it is the lowest grade of paper that is relegated to mulch and compost feedstocks, since they are the lowest value products made from recovered paper.” (TR lines 103-107.)

“Paper considered unsuitable for recovery, repulping or recycling into paper, or otherwise rejected by pulping mills, can still be used to make compost and may be used as a feedstock in MSW compost. Reasons for rejection include the presence of food-soiled paper or napkins, and amounts too small to bale for transportation to the de-inking facility. However, some paper is also rejected due to toxic contaminants and other impurities. Plastics, motor oil, paint, glass, and other non-paper materials may interfere with the composting process, downgrade compost quality, or even render the compost harmful to soil organisms, plants and humans. The less pre-sorting done with recovered paper, the greater the perceived likelihood that it will have contaminants that interfere with recycling and composting (ISRI 2016).” (2017 TR lines 121-129.)

Additional annotation?

The current annotation is easy to understand and apply. However, the new information in the TR seems to indicate that it may be inadequate to delineate paper that –regardless of regulation– would be desirable for use by a grower. The NOSB should ask whether there is any way an additional annotation could be used by the grower. Could an annotation specifically oriented towards mulch products be helpful?

Additional Questions

It would be helpful to the grower if the NOSB would suggest guidance on sourcing paper to use for mulch and composting. To do that, the recent TR should be supplemented with information that is more oriented towards source. The TR has identified paper food packaging

as a source of chemicals that growers might want to avoid, even if the annotation remains unchanged. It also appears that newspaper and other wastepaper may have chemical additives that organic growers would like to avoid. The NOSB should seek out information about whether there are ways for growers to choose paper for mulch and compost that are free from toxic and endocrine-disrupting chemicals.

Conclusion

Given the information currently available to the NOSB, there is a need for growers and certifiers to identify sources of recycled paper that are compatible with organic principles. Based on information in the most recent technical review, we must advise that the NOSB recommend against relisting newspaper and other paper. The new information only leaves us with more questions regarding how growers can ensure that the paper they use “fosters cycling of resources, promotes ecological balance, and conserves biodiversity,” as required by law. We request that the CS keep newspaper and recycled paper on its work agenda in order to address some of the issues raised here –in particular, whether there is a way for growers and certifiers to identify sources of recycled paper that are compatible with organic principles.

Plastic mulch and covers

205.601(b) As herbicides, weed barriers, as applicable. (2) Mulches. (ii) Plastic mulch and covers (petroleum-based other than polyvinyl chloride (PVC)).

Plastic mulch has received much attention because of the need to remove it at the end of the growing season, which results in plastic waste being hauled to landfills. Biodegradable biobased bioplastic mulches have been listed by the NOP with annotations (restrictions) and are expected to eliminate some of the problems with plastic mulches. However, there is still no guidance on ensuring that bioplastic mulch degrades in the required timeframe, and no mulches are currently available that meet the criteria established by the NOSB and NOP.⁹

Plastic mulch harms the environment.

Those testifying in favor of biodegradable biobased bioplastic mulch have advanced good arguments against conventional plastic mulches –tons of plastic is taken to the landfill, but much gets left behind in irretrievable shreds in the soil. Otherwise, the Crops Subcommittee presented other facts relevant to the impacts of conventional plastic mulches in its 2015 checklist (“Supplemental Review Information”):

- Polyethylene is usually derived from either modifying natural gas (a methane, ethane, propane mix) or from the catalytic cracking of crude oil into gasoline, though it may be made from biological sources.¹⁰
- Substitution for natural mulches reduces inputs of organic matter.
- Solarization kills microorganisms.

⁹ <http://www.omri.org/news/124773/nop-clarifies-biobased-mulches>.

¹⁰ Priscilla Lepoutre, The Manufacture of Polyethylene. <http://nzic.org.nz/ChemProcesses/polymers/10J.pdf>.

- Loss of water: In one season, the loss of water was 2-4 times higher and the loss of soil sediment was three times higher in plots where PE mulch was used compared to those where hairy vetch residues were used.

Plastic mulch fulfills limited needs.

As has been pointed out, alternatives are available, including organic mulches, living mulches, recycled newspaper, and other paper. These mulches degrade, adding organic matter to the soil. Other practices are available: for weed control, tillage and other mulches; for soil warming, planting adapted plants. On the other hand, those who wish to grow warm season crops in cool climates depend on plastic mulch to extend their growing season.

One alternative is biodegradable biobased bioplastic mulch (BBBM). The concern over its biodegradability caused both the NOSB and NOP to require complete degradation to meet the requirement of “removal” each season. We are concerned about the onus that this requirement places on the grower. Unfortunately, NOP has not produced the promised guidance that would have helped growers determine how to use BBBM in a way that ensures complete degradation under a variety of weather and soil conditions.

Plastic mulch is inconsistent with organic practices.

The use of a synthetic material made from nonrenewable resources that produces so much waste and takes the place of a practice –mulching with organic materials—that contributes organic matter to the soil is clearly inconsistent with organic practices when used on a large scale.

Conclusion

The NOSB should phase out plastic mulch. As a first step, its use could be limited to those cases in which organic mulches or cover crops cannot perform the necessary function. Meanwhile, the NOSB should consider an annotation requiring the highest recycled content available for the plastic mulch. We believe that an annotation is necessary to ensure that OFPA criteria are met. We support research into the most cost- and labor-effective methods of mulching that can be used in place of BBBM or plastic mulch. Such research should consider separately weed suppression and soil warming, for which alternatives may be different. Organic no till practices are within the scope of this research.

Aqueous potassium silicate

205.601(e)(2) - Aqueous potassium silicate (CAS #-1312-76-1) - the silica, used in the manufacture of potassium silicate, must be sourced from naturally occurring sand.

205.601(i)(1) - Aqueous potassium silicate (CAS #-1312-76-1) - the silica, used in the manufacture of potassium silicate, must be sourced from naturally occurring sand.

The Organic Foods Production Act requires that substances be listed on the National List “by specific use or application.” These listings in §601 do not meet this requirement. We request that all listings be annotated with the specific use or application.

Beyond Pesticides opposes the relisting of aqueous potassium silicate (APS) for both the insecticide and the plant disease control uses. It has been found by the NOSB not to meet the OFPA criteria of essentiality and compatibility with organic production. There are potential adverse impacts that have not been evaluated by the NOSB.

Historical support for APS has been at best lukewarm. The checklist from the 2007 decision checks “no” for the questions asking whether the essentiality and compatibility criteria are met, separately for each use. The CS should investigate organic management systems that conserve and build available silicon in the soil as alternatives to potassium silicate, addressing nonsynthetic materials and practices that would avoid the need for potassium silicate that involve soil management as well as foliar treatments.

Pesticides may cause adverse effects not only through direct toxic action, but also through changes induced in plants. Potassium silicate makes plants more resistant to disease and herbivory, at least in part by concentrating silica. Humans and livestock are among the herbivores who might be consuming the treated plants. High levels of silica in plants decreases digestibility and may contribute to kidney stones.¹¹ The revised petition (2006) states that soluble silicate provides higher concentrations of silica in plants than are produced by natural sources. We believe that it is an adverse health effect if people cannot receive the nutrition they expect from a crop. The CS should therefore investigate the question of whether the foliar application of potassium silicate might have impacts on the nutritive value of treated foods that would exceed the impacts of silica obtained by the plant from natural soils.

Information in the 2014 TR supports the conclusions below. (Citations are to line numbers in TR.)

1. Dermal exposure can lead to low to medium systemic toxicity and skin irritation (577-579);
2. Silicon reduces the availability of elements such as manganese, iron, and aluminum to roots (471-473);
3. Treatment with potassium silicate may not be appropriate when crops are used for feeding or as forage for livestock because it makes some forages less digestible (540-543);
4. The addition of potassium silicate as a foliar nutrient may result in the production of less tender fruits and vegetables or forage for grazing animals (477-481);
5. Silica supplementation can result in elongation and thickening of stems, delayed antithesis and flower deformation in some species (487-490);
6. In addition to morphological changes, changes in micronutrient in plants may occur as a result of silica supplementation (490-492);
7. New alternative materials suggested include other forms of silica that are available as approved supplements for the soil that can provide the same protection over a longer term against plant disease and compost made with silica-rich plants (598-605, 676-678);

¹¹ Mayland, H.E. and Shewmaker, G.E. (2001) Animal health problems caused by silicon and other mineral imbalances, *Journal of Range Management*, 54, pp. 441-446. <http://eprints.nwisrl.ars.usda.gov/125/1/1047.pdf>.

8. The TR suggests the following alternative practices: soilscaping, choice of variety and planting time, balancing silica accumulators and nonaccumulators, moisture management, choice of mulch and ground cover, and scouting (661-689); and
9. Internationally (Japan, Canada, EEC, CODEX, or IFOAM), natural sources of silica, not APS, are allowed (258-296).

There is still uncertainty around two major issues:

1. Potassium silicate makes plants more resistant to disease and herbivory, at least in part by concentrating silica. Humans and livestock are herbivores who might be consuming the treated plants. Does the foliar application of potassium silicate have impacts on the nutritive value of treated foods that would exceed the impacts of silica obtained by the plant from natural soils? The TR addressed this to some extent (See #3, 4, and 6 above.) How should the NOSB weigh this impact on the nutritive value of treated plants?
2. The central issue in the essentiality question is whether organic management systems that conserve and build available silicon in the soil are alternatives to potassium silicate. Thus, the subcommittee received some information on this issue (see #7 and 8 above) and is interested in comments concerning nonsynthetic materials and practices (involving soil management as well as foliar treatments) that would build comparable resistance to insects and fungi, while precluding the need for synthetic potassium silicate.

To what extent does the new limited scope TR address the issues we have raised?

Is potassium silicate taken up by plants?

Some plants absorb it through the roots, and others through leaves.

If it is taken up, is it in plant tissues that are consumed as food or feed?

The answer to this is unclear, since it appears that research has focused on residues in and on leaf tissues of plants in which the fruit is the edible part (tomatoes, cucumbers, grapes, greens, and grains).

What is the effect on the phyllosphere?

The statement in the TR, “Silicates also preferentially attack fungi and fungal pathogens (Liang et al., 2015; Laane, 2018)” appears to indicate that silicates do not attack beneficial species, whereas the source materials indicate that the preferential impact is on fungi rather than bacteria, without regard for pathogenicity. A healthy microbial community on the plant leaf can protect plants from disease,¹² so it is foolhardy to disrupt that microbiome.

Does it make nutrients less available?

Because of the focus on nonfood tissues, this is not addressed.

What are the hazards to workers?

The question posed to the TR authors was “When sprayed under low humidity conditions, can aqueous potassium silicate crystallize in the air and present an inhalation hazard?” The TR is negative concerning crystallization of APS in the air. However, elsewhere we

¹² Zhan, C., Matsumoto, H., Liu, Y. *et al.* Pathways to engineering the phyllosphere microbiome for sustainable crop production. *Nat Food* 3, 997–1004 (2022). <https://doi.org/10.1038/s43016-022-00636-2>.

see that APS application results in a powdery layer on leaves—potassium silicate or silicic acid, amorphous silica, and salts of an added acid—which remains until washed off. These dislodgeable residues may present a greater hazard to workers cultivating plants after the spray has dried because they would not be wearing the protective clothing required for application.

How should the NOSB address the disclosure of nanoparticles?

The TR refers to "suspended nanoparticles" when APS is applied. In 2010, the NOSB adopted a recommendation proposing that engineered nanomaterials be prohibited from certified organic products as expeditiously as possible.¹³ NOP did not accept that recommendation but said that nanomaterials would be dealt with just as any other synthetic materials going through the petition process.¹⁴ It appears that these APS nanoparticles would meet neither the NOP's nor NOSB's definition of engineered nanomaterial, but would be considered "incidental nanomaterials." To be considered an engineered nanomaterial there must be an intent by the manufacturer to make the material at the nanoscale for a certain reason. "Incidental nanomaterials" occur naturally or created during traditional food production or processing. Since the nanoparticles of APS occur whenever the pH is below 8, we believe that they meet the "naturally occurring" exemption.

However, we do not believe that the determination that nanoparticles in a particular substance are incidental nanomaterials should be made without due consideration. Petitioners should disclose the possible presence of nanoparticles, and the NOSB subcommittee should address the question of whether they are engineered or incidental just as it would address the classification as synthetic or nonsynthetic.

Elemental sulfur

205.601(e)(5) - As insecticides (including acaricides or mite control).

205.601(i)(10) - As plant disease control.

205.601(j)(2) - As plant or soil amendments.

The Organic Foods Production Act requires that substances be listed on the National List "by specific use or application." These listings in §601 do not meet this requirement. We request that all listings be annotated with the specific use or application.

The need for sulfur has not been demonstrated in NOSB decision documents.

Sulfur may be needed for one or more of the three listed uses, but the TAP reviews, minutes, and NOSB recommendations do not provide a justification for the need. Because these listings do not, as required by OFPA, list elemental sulfur "by specific use or application," the use is difficult to ascertain. This is compounded by the reliance of the 2018 TR on EPA pesticide registration documents. Since essentiality is one of the criteria that must be met for synthetic materials to be used in organic production, the NOSB must document the need and state the specific use in annotations.

¹³

[https://www.ams.usda.gov/sites/default/files/media/NOP%20Materials%20Final%20Rec%20Engineered%20Nono materials.pdf](https://www.ams.usda.gov/sites/default/files/media/NOP%20Materials%20Final%20Rec%20Engineered%20Nono%20materials.pdf).

¹⁴ PM 15-2. <https://www.ams.usda.gov/sites/default/files/media/NOP-PM-15-2-Nanotechnology.pdf>.

Sulfur has significant health and environmental impacts.

Sulfur poses a threat to farmworkers. It was the cause of the most agriculture-related acute illnesses in California between 1984 and 1990. Drift of the dust may harm humans, plants, and aquatic systems. In addition, its manufacture is associated with sulfur dioxide pollution. The 2018 TR is inadequate. Because it relies almost completely on EPA pesticide registration documents, it underestimates health and environmental effects, sometimes presenting contradictory information, as can be seen in the response to Evaluation Question #10, "Describe and summarize any reported effects upon human health from use of the petitioned substance." This response starts with two paragraphs minimizing the health effects of sulfur (referring to EPA's Registration Eligibility Document), then mentions reentry restrictions, and in the final two paragraphs, presents data documenting hazards to workers and nearby communities.

In 2011, the NOSB demonstrated concern over worker protection by including language in the narrative portion of the recommendation on coppers:

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.

This never happened. Since the NOP has not taken action to advance such guidance and has taken action to limit NOSB workplans to consideration of petitions for and reviews of National List materials, we ask that the NOSB recommend the inclusion of language protecting workers in the listings for sulfur. 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 sulfur may be one of 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."

The 2018 TR documents adverse health impacts on people living near farms using sulfur: People that live in agricultural communities near applications of elemental sulfur can be adversely affected. Specifically, reports have included nonoccupational cases of contact allergies, dyspnea, hypoxemia from an individual being exposed to sulfur drifting from a treated field, sulfur inhalation leading to a sore throat, chest pain, and acute tracheobronchitis. A recent report from UC Berkeley studied the correlation between elemental sulfur use and pediatric lung function. The study included a data set of 357 children at 7 years of age and evaluated associations between residential proximity to elemental sulfur applications and respiratory symptoms. After adjusting for other mitigating factors, the findings suggest that sulfur use in close proximity to residential areas may adversely affect the respiratory health of children. Adverse respiratory associations were only found within 0.5 and 1 km radii of the agricultural application. A strong correlation between asthma medication usage and respiratory

symptoms was observed per every 10-fold increase in the estimated amount of sulfur used within 1 km of the child's residence. While the study had several limitations, such as the collection of high-quality data from young children or not evaluating the children's personal exposure to elemental sulfur, the findings were consistent with previous reports on adverse respiratory effects associated with elemental sulfur in animal models, in workers, and in case reports of poisoning. This study also lends credibility to reports of drift of elemental sulfur after agricultural application.¹⁵

Sulfur's contaminants must be limited.

Synthetic elemental sulfur comes from scrubbers from fossil fuel plants and may be contaminated with other metals. Heavy metals do not degrade, and may therefore build up in the soil, particularly when sulfur is used as a soil amendment. The Washington Department of Agriculture's fertilizer database lists varying rates of contamination of OMRI-listed sulfur products with arsenic, lead, selenium, cadmium, cobalt, mercury, molybdenum, nickel, and zinc.¹⁶ We ask that the NOSB explore avenues to limit contamination –either through an annotation or through the project to limit contamination of organic farm inputs.

Sulfur has a negative impact on agroecosystems.

Sulfur has adverse impacts on predators and parasites. Specifically, its impacts are rated "Low to High" to predatory mites, "High" to parasitoids, and "Low to Moderate" to general predators.¹⁷ These impacts make its use incompatible with organic production systems.

Conclusion

The NOSB must make a case for the need for sulfur in organic production, protect workers who use it and the surrounding communities, and ensure that its use does not result in ecological imbalance. The Crops Subcommittee should investigate the particular uses of elemental sulfur in plant disease and insect control to determine when they are necessary, and the committee should propose an annotation for specific uses. These measures may require annotation of the listings in order to ensure that OFPA criteria are met. We suggest this worker protection annotation, "Steps to meet worker protection standards must be documented in the Organic System Plan." The NOSB should investigate ways to limit heavy metal contamination of elemental sulfur.

Lime sulfur

205.601(e)(6) - As insecticides (including acaricides or mite control).

205.601(i)(6) - As plant disease control.

The Organic Foods Production Act requires that substances be listed on the National List "by specific use or application." These listings in §601 do not meet this requirement. We request that all listings be annotated with the specific use or application.

¹⁵ Elemental Sulfur TR, April 19, 2018. Lines 430-446. Internal citations removed.

¹⁶ <https://agr.wa.gov/pestfert/fertilizers/productdatabase.aspx>.

¹⁷ UC Davis, IPM Online, Sulfur <http://www.ipm.ucdavis.edu/TOOLS/PNAI/pnaishow.php?id=67> 1/12/2015.

Lime sulfur poses hazards to humans and the environment.

Lime sulfur poses serious hazards if misused or accidentally spilled.¹⁸ If mixed with acids or phosphate fertilizers, it can release deadly hydrogen sulfide gas.¹⁹ The TR says, “The available literature suggests that large volume releases of lime sulfur will adversely affect the viability and reproduction of non-target microorganisms, including beneficial soil bacteria and fungi. It is highly probable that both target and non-target plants, insects, mites and fungi will be impacted by lime sulfur treatments to some extent due to direct application and/or spray drift to neighboring areas.”²⁰

Use of lime sulfur can interfere with biological control.

Labels list scales, mites, aphids, “over-wintering insect eggs,” case bearers, and peach twig borers as targets of lime sulfur applications. Lime sulfur kills adults and larvae of predator mites, as well as reducing the feeding rate and fecundity of survivors.²¹ San Jose scale is well known as an insect naturally controlled by predators that becomes a secondary pest when broad-spectrum insecticides are used.²² Biological control is also a successful means of controlling aphids.²³

Lime sulfur plays an important role in management of fire blight without antibiotics. While early season use of lime sulfur for managing disease may have little impact on natural biological controls, increasing the frequency and rate of lime sulfur use –as in use for thinning and applications when arthropod predators and parasites are present— can have a negative effect on biological control.²⁴ It also interferes with the action of biological controls of the fire blight organism and must not be used simultaneously with them.

Use of lime sulfur may be incompatible with organic production.

It appears that most, if not all, arthropod targets of lime sulfur sprays can be controlled biologically, and that use of lime sulfur when the pest (and its predator or parasite) are present would be disruptive of the agroecosystem. This is true of the insecticide use as well as use for disease control when predators and parasites are present. The creation of secondary pests – that is, the use of materials that kill predators and parasites– is a major contributor to the “pesticide treadmill.”

Conclusion

The Crops Subcommittee must investigate the particular uses of lime sulfur in plant disease control to determine whether they are necessary, and whether lime sulfur can be

¹⁸ TR lines 342-348.

¹⁹ Oregon OSHA, Hazard Alert: Lime sulfur reacts to form deadly hydrogen sulfide gas. <http://www.cbs.state.or.us/external/osh/pdfs/hazards/2993-19.pdf>.

²⁰ TR lines 395-396; 420-422.

²¹ Beers, E. H., Martinez-Rocha, L., Talley, R. R., & Dunley, J. E. (2009). Lethal, sublethal, and behavioral effects of sulfur-containing products in bioassays of three species of orchard mites. *Journal of economic entomology*, 102(1), 324-335.

²² Gulmahamad, H., & DeBach, P. (1978). Biological control of the San Jose scale *Quadraspidotus perniciosus* (Comstock)(Homoptera: Diaspididae) in southern California. *Hilgardia*, 46(7), 205-238.

²³ Hågvar, E. B., & Hofsvang, T. (1991). Aphid parasitoids (Hymenoptera, Aphidiidae): biology, host selection and use in biological control. *Biocontrol news and Information*, 12(1), 13-42.

²⁴ It should be noted that lime sulfur is not listed for fruit thinning.

used for the purpose without disrupting natural controls. If it can, the listing should be annotated, “For use only when beneficial arthropods are not present.”

Sucrose octanoate esters

205.601(e)(10) - As insecticides (including acaricides or mite control).

In the Fall 2018 meeting, the NOSB recommended that sucrose octanoate esters (SOEs) be removed from the National List at both §205.601 and §205.603 based on the information that there are no registered uses of SOEs. AMS responded on February 21, 2019, “AMS is reviewing the Board’s recommendations to remove sucrose octanoate esters from the National List.” Nevertheless, SOEs remain on the National List in both sections.

SOEs are surfactants –closely related to soaps– that have a mode of action similar to insecticidal soaps. However, a limited number of experiments have shown SOEs not to affect a range of predators and parasitoids that are killed by insecticidal soaps. Impacts on soil fauna have not been established. They have low toxicity to humans and are produced in a closed system. If SOEs were to be listed, more information would be needed about the toxicity of SOE to non-target organisms including predators, parasitoids, soil fauna, and aquatic organisms, when exposed by spray. Further information is also needed concerning the relative efficacy and hazard of SOEs in control of varroa mites, as listed in §205.603. However, the fact that no SOE products are registered by EPA makes this moot.

Conclusion

SOEs should be removed from §§601 and 603, as recommended by the NOSB in 2018.

Hydrated lime

205.601(i)(4) - As plant disease control.

The Organic Foods Production Act requires that substances be listed on the National List “by specific use or application.” This listing in §601 does not meet this requirement. We request that all listings be annotated with the specific use or application.

Used as a soil amendment, hydrated lime can pose human health and environmental hazards. We support the listed use, restricted to plant disease control, annotated with a specific use or application.

Alternative materials include copper, sulfur, hydrogen peroxide, and lime sulfur.²⁵ Hydrated lime is preferable to some of these. Alternative disease control methods include crop rotation, resistant crops, sanitation, managing soil to suppress disease, nutrient management.²⁶ Its use as a component of Bordeaux mix is historically accepted.²⁷

²⁵ 1995 TAP, p. 6. Coppers 2011 TR line 966.

²⁶ Coppers 2011 TR lines 1014-1019.

²⁷ 1995 TAP p.5.

Conclusion

Beyond Pesticides supports the relisting of hydrated lime as disease control. Although the annotation limiting the use of hydrated lime to disease control eliminates objectionable use as a soil additive, correcting the annotation to include a specific use or application, such as “as a part of Bordeaux mix” would be consistent with OFPA and more consistent with the original recommendation of the NOSB. We note that in the past, some commenters supporting relisting cited uses that are outside the scope of the annotation.

Liquid fish products

205.601(j) As plant or soil amendments (7) Liquid fish products —can be pH adjusted with sulfuric, citric or phosphoric acid. The amount of acid used shall not exceed the minimum needed to lower the pH to 3.5.

The Organic Foods Production Act requires that substances be listed on the National List “by specific use or application.” This listing in §601 does not meet this requirement. We request that all listings be annotated with the specific use or application.

Liquid fish products remove valuable nutrients from marine ecosystems and may harm agroecosystems.

While some liquid fish products are made from fish waste,²⁸ others are made from whole fish harvested for the purpose.²⁹ Fish that do not have commercial value may have ecological value.³⁰ Use of discarded fish parts as fertilizer may also remove food from marine ecosystems.³¹

Acids used to manufacture liquid fish products may cause harm to the environment if misused or improperly discarded. Some liquid fish products are acidic, and too strong a solution can burn plants.³² Fish products may contain persistent, bioaccumulative toxic chemicals that can affect crops and livestock over the long term.³³

Synthetic liquid fish products are not essential.

Fish may be preserved naturally. The technical review says,³⁴ [An] option is to ferment the fish and fish waste by adding a carbohydrate source, such as molasses, along with *Lactobacilli* starter culture (lactic acid producing bacteria). *Lactobacilli* convert sugar into lactic acid, which preserves the fish and creates favorable conditions for the production of silage. Some types of *Lactobacilli* produce other

²⁸ Eg, <http://www.neptunesharvest.com/info.html>.

²⁹ Eg, <http://www.rainyside.com/resources/fishfert.html>.

³⁰ <http://discovermagazine.com/2001/sep/featfish/?searchterm=menhaden>.

³¹ <http://www.scotsman.com/news/environment/ban-on-fishing-discards-may-damage-ecosystem-1-3408818>.

³² TR lines 173-181.

³³ José G. Dórea, 2008. Persistent, bioaccumulative and toxic substances in fish: Human health considerations. Science of the Total Environment, *Volume 400, Issues 1–3*, 1 August 2008, Pages 93–114. <http://www.sciencedirect.com/science/article/pii/S0048969708006748>.

³⁴ TR lines 143-150.

substances in addition to acid, such as antibiotics or bacteriocins, which help to limit the growth of spoilage bacteria. To obtain the optimum temperature of the fermentation process (25° to 30°C) additional heating may be required during certain times of the year (Archer, 2001). Fish hydrolysate also can be pasteurized in a dehydrator or spray-dryer to form spray-dried fish hydrolysate.

In addition, other natural materials that could substitute for synthetic fish products are manure, compost, aquatic plant products, blood meal, bone meal, compost, feather meal, kelp meal, guano, and other nonsynthetic animal or plant products.³⁵

Synthetic liquid fish products are 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 nutrients are to be used at all, it must be as an exception and in concert with soil building practices that restore the soil balance naturally.

Conclusion

Liquid fish products should be removed from the National List because they remove valuable nutrients from marine or aquatic ecosystems and are incompatible with organic production, given the availability of other practices to enhance soil biology and cycle nutrients. It is concerning that so many growers seem to rely on this synthetic material for routine fertility.

If liquid fish products remain on the National List, they should be annotated with “must be harvested from a designated area that has had no prohibited substance, as set forth in §205.105, applied to it for a period of 3 years immediately preceding harvest; must be harvested in a manner that ensures that such harvesting or gathering will not be destructive to the environment and will sustain the growth and production of the population of the species.”

Sulfurous Acid

205.601(j)(11) - Sulfurous acid (CAS # 7782-99-2) for on-farm generation of substance utilizing 99% purity elemental sulfur per paragraph (j)(2) of this section.

The Organic Foods Production Act requires that substances be listed on the National List “by specific use or application.” This listing in §601 does not meet this requirement. We request that all listings be annotated with the specific use or application.

Beyond Pesticides opposes the relisting of sulfurous acid to correct alkalinity in soil that has accumulated carbonates and bicarbonates through irrigation water in more arid regions. There are potential adverse impacts that have not been evaluated by the NOSB.

The most recent technical review raises these issues:

³⁵ TR lines 239-246.

1. The TR contains information about environmental impacts of sulfurous acid, particularly on soil organisms. (TR lines 355-358; 281-282)
2. There is information on alternative materials and practices that was not considered by the board in 2009. (TR lines 374-426)
3. It appears that sulfurous acid is used to correct the impacts of unsustainable irrigation practices. (TR lines 127-141)
4. This use of sulfurous acid is not permitted in organic agriculture in other countries. (TR lines 182-215)
5. Sulfurous acid delivers a synthetic plant nutrient, and is therefore a synthetic fertilizer. (TR lines 143-149)

While most of these issues have been discussed by the NOSB, the crucial question with respect to compatibility with organic practices is whether sulfurous acid is used to enable the continued use of unsustainable agricultural practices. The build-up of alkaline salts results from unsustainable agricultural practices. As stated by Richard Cowen of UC Davis,

Therefore, irrigation can only be maintained on a long-term basis in the following conditions. Water is applied in such a way that salt is not allowed to build up in the soil. Usually, this means that a lot of good-quality water is applied, and that drainage is rapid and efficient. Soils need a large infusion of fertilizer, to balance the flushing that is required to keep them salt-free.

A region that can be irrigated on a long-term basis thus has:

- An abundant supply of good water.
- Well-drained soil.
- Good regional drainage.
- A supply of fertilizer for the soil.

If any of these conditions fails, the system will eventually fail. Such failures have brought down civilizations that solved the engineering and logistic problems of designing, building, and maintaining irrigation systems, but neglected the long-term effects of salinization or nutrient depletion. Long-term problems of irrigation may not appear for a long time: today, for example, the valleys and basins of the San Joaquin, Rio Grande, Indus, Nile, Murray-Darling, Jordan, and Tigris-Euphrates are being irrigated, with progressive and visible increases in salinization and water-logging, and no remedy in sight. Only a few civilizations based on irrigating dry country have lasted for any length of time: sensible civilizations should not try to grow wetland crops in arid climates.

The major success stories for civilizations based on agricultural irrigation are Egypt and China. The major stories of failure are happening right in front of us. In present-day California, a giant industry is trying to maintain an irrigation economy with a diminishing supply of poor-quality water, on clay soils with very poor natural drainage, in an almost

landlocked plain with poor or non-existent regional drainage, applying water that has been stripped of its natural load of silt.³⁶

Another compatibility issue comes from the comparison with limestone and hydrated lime. While limestone is a permitted natural material used for raising the pH of acid soils, the more rapidly available (and synthetic) hydrated lime is not allowed as a soil amendment in organic crop production. The NOSB should consider whether there is a parallel with sulfur and sulfurous acid. Adding elemental sulfur slowly acidifies the soil through microbial transformation to sulfate. Use of sulfurous acid is comparable to the use of hydrated lime, both of which short-circuit natural biological mechanisms. “Overuse of sulfurous acid and subsequent acidification will cause the metabolism of microorganisms involved in compost and organic matter breakdown in treated streams and runoffs to be suppressed along the acidity gradient, and can lead to a decrease in humus production.”³⁷ The 2002 TAP for hydrated lime says, “Natural sources of mined limestone or gypsum are more slowly soluble and contribute to soil fertility and neutralization over a longer term. . . A neutral pH is beneficial to the soil organisms, but rapid pH changes may cause short-term fluctuations and disruptions in population levels.” We suggest that a similar analysis should be applied to sulfurous acid.

Conclusion

Beyond Pesticides opposes the relisting of sulfurous acid to correct alkalinity in soil that has accumulated carbonates and bicarbonates through irrigation water in more arid regions. The NOSB needs to ask whether the “need” for sulfurous acid reflects unsustainable farming practices. It is incompatible with organic production in the same way that hydrated lime is. In addition, it would be relevant to discuss the use of sulfurous acid in conjunction with other water issues, such as the use of “produced” water, or water resulting from fracking.

Ethylene

205.601(k) - As plant growth regulators. Ethylene gas - for regulation of pineapple flowering.

Ethylene gas is used to promote uniform flowering –and hence uniform fruit production— of pineapples. It is used more often by large pineapple producers than small producers because of the cost. It is mostly made from hydrocarbon feedstocks, is toxic to plants and animals, and poses dangers as an explosive gas.

Past decisions have considered the differential impact on different scales of production.

Ethylene gas is hazardous to humans and the environment.

Almost all the ethylene used will eventually end up in air; a small proportion will end up in water.³⁸ Ethylene is made from hydrocarbon feedstocks, such as natural gas liquids or crude

³⁶ Richard Cowen, “Ancient Irrigation,” Chapter 17 of *Essays on Geology, History, and People*.
<http://mygeologypage.ucdavis.edu/cowen/~GEL115/115CH17oldirrigation.html> Accessed 12/29/2012.

³⁷ Sulfurous acid TR, lines 333-335.

³⁸ 1999 TAP, p.2.

oil. It is explosive. It requires boiler feed water preparation, treatment of noxious effluents, and steam and electric generation.³⁹

Direct exposure may result in acute toxicity leading to death of animals, birds, or fish and death or low growth rate in plants. It is slightly acutely toxic to aquatic life. Although insufficient data are available to evaluate or predict the short-term or long-term effects of ethylene to birds or land animals, "Chronic toxic effects may include shortened lifespan, reproductive problems, lower fertility, and others."⁴⁰ Worker safety is a concern.⁴¹

Ethylene is not essential for organic production.

The need to produce uniform flowering of pineapples is only essential for a particular style and scale of pineapple culture. The NOSB is not obliged to approve synthetic materials that make every style and scale of agriculture possible. Rather, it is the responsibility of organic growers to use methods consistent with organic practices.

In 2015, Accredited Certifiers Association provided responses to a survey. None of the certifiers responding reported certifying growers using ethylene. One respondent, who explained in detail the method of application, said that it is highly unlikely that a small pineapple producer could afford the equipment.

The use of ethylene gas is incompatible with organic production.

There is no category in OFPA §6517(c)(1)(B)(i) for synthetic growth regulators. As pointed out by Reviewer 3 in the TAP review, the use of such synthetic materials is contrary to consumer expectations. This reviewer also said, "It appears the ethylene use in pineapples is more a question of economics and farm size rather than agronomic need."

Colehour Bondera, an organic farmer from Hawai'i, offered this statement when he was on the NOSB:⁴²

I want to take a few minutes of our time to put in the record a slightly different set of perspectives on this topic of ethylene gas and pineapples than has been presented. And I honestly do not think that somebody could argue that I could have or should have asked these as questions to the people while they were testifying. But honestly, I think it's more perspective than question/answers.

And I just want to talk about organics for a second and think about creating an organic system that's reliant on a synthetic and how, from my perspective and experience, that's not my role or goal and sitting here on the NOSB. That's something I'm trying to, I mean, that's one of the reasons that we have Sunset, but if you read off, but you don't want to be dependent upon a synthetic.

³⁹ 1999 TAP, pp. 1-2.

⁴⁰ 1999 TAP, p. 2.

⁴¹ Supplemental TR 2000, p. 3.

⁴² Transcript, pp. 1043-1051.

And I think that frankly and truthfully, I live in Hawaii. And where did Dole have their pineapple production 20 years ago? It wasn't in Costa Rica. Not at all. If you listen to the testimony and you listen to the numbers of years that those people were talking about, not one of them mentioned any 20 years ago. There was no organic pineapple or export industry in the country of Costa Rica 20 years ago. Dole, the company, moved it from Hawaii where they had all of their, they're called plantations in the State of Hawaii, operations, producing pineapples, organic pineapples and otherwise from Hawaii because it was too costly for the company, Dole, to Costa Rica. That is what happened. I'm speaking about reality, not my opinion. And all of those people who worked for those all went out of work. So if we're considering the impacts on families and the impacts on people, it all happened in the State of Hawaii.

And they all moved to, it all got moved to Costa Rica. And I think that that dependency on a market, which is the United States depending on organic pineapples being imported into the country from Costa Rica which, like I just said and it's the truth, I'm not hypothesizing, moves when they aren't making enough money, then what's going to happen to those people who've become dependent on it in the country of Costa Rica, which I understand these people are still here right now listening to me, and we heard their testimony, they're relying on this, will we destroy them? No, but will a company that moves destroy them? So I want us to think about that dependency issue, but I also want us to think about what we saw in some of those pictures because I think that was critical.

That was monoculture. And I understand organic systems very well. I live in one and I work in them and I do things in them. Organic systems aren't about monoculture. But what we saw in those pictures was monoculture, and that's the system that's not just created, but these families are dependent on.

And I'm going to wrap up in a second, but I just want to make a couple more quick comments. I already mentioned the fact that small scale direct operators which primarily isn't what's happening in Costa Rica pineapple production, like me, for example, I'm direct selling my pineapples. I don't need them at one time to go on a container to be shipped somewhere. And so I think that these factors relate to the concept of seasons.

I grew up on a farm in Oregon. We had seasons. I live in Hawaii, we have different seasons, just like in Costa Rica. We have two seasons, not four. We have rainy and wet season. But realistically and honestly, organics is trying to imitate conventional and it's trying to say all products that you want are available 24/7 around the world. And organics needs to really look to be unique and different and stand out from conventional, not just imitate the systems that are in place.

And I think that we don't need to be relying on imitation and people making a little bit more money, that's not our goal or our role. I'm not concerned. Sitting on the NOSB, I'm

not worried about how much money is being made. That's not one of our decision factors.

And I really think that for that reason, even though I already know that I will not, my vote will not be the end of the day, the result, I'm not going to vote in support of continuing relying on ethylene gas for inducing the flowers of pineapples so that they can be more easily exported by these companies to the stores, so they could be distributed to people instead of having them rely on more seasonality and functionality, and/or to wrap it up, to be paying those people in Costa Rica more money for more work to be managing those pineapples on the ground and the company not making as much profit.

So I just want to put those thoughts out there because they are reality, and they I think really should be affecting our decisions about this kind of question. Thank you.

Conclusion

Ethylene gas should be delisted because it fails to meet the OFPA criteria of freedom from health and environmental harm, essentiality, and compatibility with organic production.

Microcrystalline cheesewax

205.601(o) - As production aids. Microcrystalline cheesewax (CAS #'s 64742-42-3, 8009-03-08, and 8002-74-2)-for use in log grown mushroom production. Must be made without either ethylene-propylene co-polymer or synthetic colors.

Microcrystalline cheesewax is used to seal the plug or sawdust spawn that is used to inoculate logs for growing mushrooms. It is a petroleum product and, though used in small quantities, does not biodegrade. There are many data gaps in the information concerning the allowed components of microcrystalline cheesewax. "Natural" soy wax from domestically-produced non-GMO soybeans—made by hydrogenating soy oil— is now available and was not considered when microcrystalline cheesewax was listed.

There are health and environmental impacts associated with the production and use of microcrystalline cheesewax.

The cheesewax is a petroleum product and therefore has environmental impact associated with petroleum production and refining. In addition, the checklist prepared by the Crops Subcommittee for the 2015 meeting lists a number of health and environmental impacts of the specific components of the cheesewax.

There is a non-petroleum-based alternative to microcrystalline cheesewax.

Soy wax from domestically-produced, non-GMO soybeans is available, and is used by mushroom producers. Soy wax is produced by the hydrogenation of soy oil, and is not listed as a nonsynthetic allowed substance by OMRI.⁴³ We believe that hydrogenation is a chemical

⁴³ <http://www.fungi.com/product-detail/product/sealing-wax-for-plug-spawn-10-pounds.html>; <http://www.sporetradingpost.com/plugs.htm>; <http://www.soya.be/soy-wax-production.php>; <http://www.omri.org/simple-gml-search/results/wax>.

change that would result in the classification of soy wax as synthetic, so we petitioned soy wax from domestically-produced, non-GMO soybeans to be added to the National List. That petition was denied. We hoped that it would eventually be found to be a substitute for microcrystalline cheesewax and be produced organically. Meanwhile, the listing of soy wax would allow organic producers of mushrooms on logs to choose a more environmentally-friendly alternative.

Conclusion

Until soy wax or other non-petroleum based wax is available to allow organic producers of mushrooms on logs to choose a more environmentally-friendly alternative, microcrystalline cheesewax should remain on the National List.

Potassium chloride

§205.602 Nonsynthetic substances prohibited for use in organic crop production.

The following nonsynthetic substances may not be used in organic crop production. . .

(e) Potassium chloride—unless derived from a mined source and applied in a manner that minimizes chloride accumulation in the soil.

Potassium chloride is an extremely soluble form of potassium. The main environmental and compatibility concern is related to excess use, which can result in chloride accumulation in the soil and inhibit nitrification. Therefore, the NOSB recommended that soil testing may be required to verify the absence of chloride build-up.

Conclusion

Potassium chloride should remain on §602.

Thank you for your consideration of these comments.

Sincerely,



Terry Shistar, Ph.D.
Board of Directors