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Docket ID # AMS-NOP-24-0081

Re. CS: Sunsets

These comments to the National Organic Standards Board (NOSB) on its Spring 2025 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.

Potassium hypochlorite

205.601(a)(2)(iv) – for use in water for irrigation purposes.

Potassium hypochlorite does not meet any of the criteria in the Organic Foods Production Act (OFPA). In addition, potassium hypochlorite should be evaluated in the context of a comprehensive review that identifies the needs for these materials in organic production.

The petitioner made comments, repeated by the Crops Subcommittee (CS) in 2019, that argued against the listing of the material:

- "KOCl is a synthetic, liquid concentrate with virtually identical properties to NaOCl."
- "Potassium Hypochlorite is essentially the same as the existing chlorine chemistries, specifically Sodium hypochlorite (NaOCl)."
- "This product is diverse as it addresses; the needs of the farmer for maintenance of their irrigation equipment, the requirements of FSMA to provides sanitation to pre-harvest irrigation water and the nutritional needs of the plant as potassium is necessary for optimal crop growth and vigor."
- "The material can also incidentally provide a source of potassium for plants."

Since potassium hypochlorite has essentially the same properties as sodium and calcium hypochlorites (aside from the incidental addition of potassium), which are also on the National

List, there was no need to add it. Chlorine chemistries cause negative health and environmental effects, and dependence on them should be decreased. If potassium hypochlorite is a significant source of potassium for plants, it should not be allowed, since it is a synthetic nutrient. In 2019, the petitioner and the CS both dropped mention of calcium hypochlorite when mentioning problems with sodium.

OFPA criteria are addressed in greater detail below.

Potassium hypochlorite poses environmental and health hazards.

The petitioner states, "Potassium Hypochlorite is essentially the same as the existing chlorine chemistries, specifically Sodium hypochlorite (NaOCl)." We address the implications of this statement for the essentiality criterion below. Here we address the environmental and health effects of substances with this chlorine chemistry.

Chlorine chemistry

Chlorine is the second most reactive element (after fluorine) in the halogen series. Halogens bond with hydrogen to form acids, are typically produced from minerals or salts, and are generally toxic. The middle halogens –chlorine, bromine, and iodine—are often used as disinfectants.[1]

Chlorine is a strong oxidizer and hence does not occur naturally in its pure (gaseous) form. Nearly all naturally occurring chlorine occurs as chloride, the ionic form found in salts such as sodium chloride. Gaseous chlorine is formed by running an electric current through salt brine.[2]

The high oxidizing potential of chlorine leads to its use for bleaching, biocides, and as a chemical reagent in manufacturing processes. Because of its reactivity, chlorine and many of its compounds bind with organic matter. In the case of bleaches, the reaction with chlorine destroys chemicals responsible for color. When used as a disinfectant, chlorine reacts with microorganisms and other organic matter. Similarly, the toxicity of chlorine to other organisms comes from its power to oxidize cells.[3]

Organic production should avoid the use of chlorine as much as possible.

Chloride, the ionic form of chlorine, occurs naturally and is necessary for life. Synthetic chlorine compounds may be inert—in which case the chlorine is responsible for a lack of biodegradability—or toxic. Chlorinated organic compounds include pesticides ranging from DDT to 2,4-D, as well as contaminants like dioxins. Chlorine gas was the first poison gas used in warfare. The largest use of chlorine is in the manufacture of polyvinyl chloride (PVC).[4]

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[1] http://www.scienceclarified.com/Ga-He/Halogens.html; http://chemwiki.ucdavis.edu/Inorganic_Chemistry/Descriptive_Chemistry/Elements_Organized_by_Block/2_p-Block_Elements/Group_17%3A_The_Halogens/1Group_17%3A_General_Properties.

[2] The Chemistry of the Halogens. http://chemed.chem.purdue.edu/genchem/topicreview/bp/ch10/group7.php.

[3] http://www.merckvetmanual.com/mvm/pharmacology/antiseptics_and_disinfectants/oxidizing_agents.html.

[4] ATSDR, Toxicological Profile for Chlorine. http://www.atsdr.cdc.gov/toxprofiles/tp172.pdf.

Chlorine gas reacts with water to produce hydrochloric acid (HCl), hypochlorous acid (HOCl), and hypochlorite (OCl^-). When hypochlorous acid reacts with ammonia, it forms chloramines, which are reactive enough to be used as disinfectants, but are more stable than hypochlorous acid and hypochlorite.

Another series of reactions creates chlorine dioxide, an extremely toxic and potentially explosive gas that dissolves in water, rather than reacting with it. Sodium chlorate is produced by electrolysis of hot salt water. Chlorine dioxide is produced by reacting sodium chlorate with a suitable reducing agent in a strongly acidic solution. Sodium chlorite may be produced from the chlorine dioxide solution under alkaline conditions using hydrogen peroxide. Acidifying the sodium chlorite solution produces chlorine dioxide for disinfection.

In addition to the purposeful production of toxic chlorine compounds, the manufacture and use of chlorine compounds results in the unintended production of other toxic chemicals. Disinfection with chlorine, hypochlorite, or chloramines results in the formation of carcinogenic trihalomethanes, haloacetic acids, and other toxic byproducts.[5] Disinfection with chlorine dioxide produces undesirable inorganic byproducts, chlorite and chlorate. Industrial production of chlorine compounds, use of chlorine bleach in paper production, and burning of chlorine compounds releases dioxins and other persistent toxic chemicals into the environment.[6]

The essential difference, then, is between chloride compounds and the toxic products and by-products of the chlorine chemical industry. Almost all of the former are naturally-occurring materials that do not share the characteristics of toxicity and undesired persistence of the latter. The fact that use of chlorine—as opposed to chloride—is so universally associated with the production of persistent toxic chemicals has led some environmental groups to seek a ban on chlorine-based chemicals. We believe that organic production should, for the same reasons, avoid the use of chlorine as much as possible. The allowance of chlorine in the rule reflects the fact that many organic growers—like most of the rest of us—depend on water sources that have been treated with chlorine. We do not believe that organic producers should have to filter chlorine out of the tap water they use for irrigating, cleaning equipment, washing vegetables, or cleaning food-contact surfaces, although irrigation with chlorinated water may be harmful to crop plants.[7] But they should not be adding more chlorine. Organic production and handling should be, to the extent possible, chlorine-free.[8]

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[5] Alexander G. Schauss, 1996. Chloride – Chlorine, What's the difference? P. 4. http://www.mineralresourcesint.com/docs/research/chlorine-chloride.pdf.

[6] ATSDR, 1998. Toxicological Profile for Chlorinated Dibenzo-p-Dioxins. Pp. 369 ff. http://www.atsdr.cdc.gov/toxprofiles/tp104.pdf.

[7] Lonigro, A., Montemurro, N. and Laera, G., 2017. Effects of residual disinfectant on soil and lettuce crop irrigated with chlorinated water. *Science of the Total Environment*, *584*, pp.595-602.

[8] The Organic Foods Production Act, §6518(m), lists three criteria that directly pertain to chlorine: (1) the potential of such substances for detrimental chemical interactions with other materials used in organic farming systems; (2) the toxicity and mode of action of the substance and of its breakdown products or any contaminants, and their persistence and areas of concentration in the environment; (3) the probability of environmental contamination during manufacture, use, misuse or disposal of such substance.

Potassium hypochlorite poses adverse impacts on human health.

Toxic Release Inventory data includes 5.7 million pounds of chlorine per year released by facilities making and using chlorine.[9] Hypochlorous acid and hypochlorite ions are highly toxic and corrosive, and EPA has placed them in Toxicity Category I (indicating the highest degree of acute toxicity) for oral, dermal, eye, and inhalation effects. When mixed with organic materials (e.g., dirt), hypochlorite produces trihalomethanes (THMs), which are carcinogenic. Hypochlorites are severe respiratory and eye irritants.[10] In 2019, the CS stated, "Bleach is a known asthmagen, and, given the similar chemistries and mechanism of action, KOCL is also likely to cause or exacerbate asthma."

Potassium hypochlorite poses adverse environmental impacts.

Potassium hypochlorite is highly toxic to fish and invertebrates.[11] When mixed with organic materials (e.g., dirt), hypochlorite produces trihalomethanes (THMs), which are carcinogenic, cytotoxic, and genotoxic.[12] It can kill beneficial microorganisms in the soil.[13] Irrigation with chlorinated water may be harmful to crop plants.[14]

Potassium hypochlorite is not essential in organic crop production.

As stated by both the petitioner and the CS, there are two materials—sodium hypochlorite and calcium hypochlorite—previously on the National List that can perform the same functions as potassium hypochlorite. While the build-up of sodium in the soil may be a reason to avoid the use of sodium hypochlorite, it is not a reason to avoid calcium hypochlorite. The availability of potassium as a synthetic crop nutrient from this material is not a justification allowed under OFPA. Potassium is a macronutrient that should be supplied by natural sources.

In addition, the 2011 Chlorine TR mentions a number of available alternative practices and materials. These include steam sterilization, UV radiation, combining UV light with oxidants;[15] as well as hydrogen peroxide, ozone, electrolyzed water, alcohols, copper sulfate, peracetic acid.[16]

Potassium hypochlorite is incompatible with organic production.

In the 2019 CS review of potassium hypochlorite, the subcommittee responded to the question, "Is the substance used in production, and does it contain an active synthetic ingredient in the following categories: [§ 6517(c)(1)(B)(i)]; copper and sulfur compounds; toxins derived from bacteria; pheromones, soaps, horticultural oils, fish emulsions, treated seed, vitamins and minerals; livestock parasiticides and medicines and production aids including

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[9] ATSDR Tox Profile for Chlorine, p. 162.
[10] 2011 Chlorine TR lines 395-471.
[11] 2011 Chlorine TR lines 270-271.
[12] 2011 Chlorine TR lines 278-279. Toxnet: Chloroform. https://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+56.
[13] 2011 Chlorine TR lines 389-390.
[14] Lonigro, A., Montemurro, N. and Laera, G., 2017. Effects of residual disinfectant on soil and lettuce crop irrigated with chlorinated water. *Science of the Total Environment*, *584*, pp.595-602.
[15] TR lines 611-628.
[16] TR lines 535-606.

netting, tree wraps and seals, insect traps, sticky barriers, row covers, and equipment cleansers; or (ii) is used in production and contains synthetic inert ingredients that are not classified by the Administrator of the U.S. Environmental Protection Agency as inerts of toxicological concern?" with the simple response, "No." Therefore, the CS judged that potassium hypochlorite is not eligible for inclusion on the National List.

Conclusion

As shown above, potassium hypochlorite does not meet any of the OFPA criteria for inclusion on the National List. In addition, we ask that the NOSB not recommend any additional or renew any listed sanitizers, disinfectants, or cleansers until it has performed a comprehensive review that identifies the needs for such materials in organic production.

Soap-based algicide/demossers

205.601(a)(7) - As algicide, disinfectants, and sanitizer, including irrigation system cleaning systems.

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

Secondly, despite the requirement in OFPA that the National list "shall contain an itemization, by specific use or application, of each synthetic substance permitted,"[17] the use pattern is not defined. Although the materials included with the original TAP review and much of the discussion in the recent TR address a use in which the substance is sprayed on surfaces covered with algae or moss, the TR also discusses alternatives to use in ponds. This is important because, while the use on surfaces like walkways and benches in greenhouses pose little environmental hazard, the use in a waterbody is quite different. As the TR says, "The acute and chronic toxicity of soap salts is markedly different for land- and water-dwelling organisms."[18]

Thus, the CS should specify which soaps and which specific uses are covered by the listing in a proposed annotation.

Ammonium carbonate

205.601(e) As insecticides (including acaricides or mite control). (1) ammonium carbonate — for use as bait in insect traps only, no direct contact with crop or soil.

Ammonium carbonate is a smelly material used in traps to attract flies. As pointed out by the Crops Subcommittee, it is volatile, and irritating to eyes and nose. The use of traps to kill adult

[17] Organic Foods Production Act, §6517(b).
[18] Soap-based Algicide/Demossers TR line 350.

flies can complement other practices directed towards larvae—manure management and enhancement of predators and parasitoids.

Ammonium carbonate poses little hazard. There is little likelihood of contamination of soil with use of ammonium carbonate as fly bait. Its manufacture includes ammonia as a reactant. Ammonia is volatile and toxic. Ammonium carbonate is an irritant to eyes and nose. It is incompatible with strong acids, nitrates, nickel, copper, but interaction is unlikely with the current annotation. It is an irritant to eyes and nose. Other insects may be attracted to the bait.

Natural alternatives include natural attractants, and other alternative materials are other ammonia-releasing chemicals. A good organic environment and enhancement of predators and parasitoids can make its use unnecessary.

Ammonium carbonate can complement manure management and enhancement of predators and parasites.

Soaps, insecticidal

205.601(e)(8) - As insecticides (including acaricides or mite control).

Insecticidal soaps are potassium salts of fatty acids that act by penetrating insect cuticle and disrupting cell membranes. They have low toxicity to humans and are broken down quickly in the environment. However, they may affect non-target insects, including predators and parasitoids, if applied when those insects are present. (Dried residues are not toxic.) They may also affect some plants. They are highly toxic to aquatic insects.[19] Alternatives are oils, botanicals, and cultural and biological controls. The information about impacts on nontarget insects has not been considered in the past. Beyond Pesticides considers insecticidal soaps, when used in a way that avoids spraying non-target insects and other arthropods, to be a "least-toxic" pesticide. The listing for insecticidal soaps should specify, "when non-target 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.

[19] National Pesticide Information Center, 2001. Potassium Salts of Fatty Acids (Technical Fact Sheet). Available at: http://npic.orst.edu/factsheets/psfagen.pdf.

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. The limited available evidence concerning the toxicity of SOE to nontarget organisms including predators, parasitoids, soil fauna, and aquatic organisms, when exposed by spray shows them to have minimal effect.[20] Further information is also needed concerning the relative efficacy and hazard of SOEs in control of varroa mites, as listed in §205.603.

There is one product, with multiple labeled uses, registered with EPA.[21]

Vitamin D3

205.601(g) - as rodenticides.

Vitamin D_3 is the "safest" of the rodenticides. Its potential for secondary poisoning, for example, is lower than for anticoagulant rodenticides. However, it still has some potential for nontarget effects, especially when used as loose bait underground. EPA's recent restrictions limit aboveground use to bait stations. The Technical Review does not examine the advantage of bait stations relative to traps. A compatibility issue is the painful death resulting from vitamin D_3 poisoning. Alternatives include traps, barriers, sanitation, flooding tunnels, and conservation of predators.

Vitamin D_3 poses environmental hazards.

Vitamin D_3 must be used in a bait station above ground, but below ground it may be used as loose bait.[22] Nontarget animals may be poisoned directly or through secondary poisoning.[23] Its toxicity to target and nontarget animals has resulted in poisoning of children and pets, as well as nontarget wildlife.[24] Newer research confirms these results.[25]

There are alternatives to Vitamin D_3.

Alternative materials include castor bean oil and repellent plants.[26] Alternative practices include traps, barriers, sanitation, flooding burrows, and conservation of predators.[27]

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[20] Michaud, J. P., & McKenzie, C. L. (2004). Safety of a novel insecticide, sucrose octanoate, to beneficial insects in Florida citrus. https://swfrec.ifas.ufl.edu/hlb/database/pdf/michaud%20mckenzie%20sucrose%20octonoate.pdf. The Florida Entomologist, 87(1), 6–9.

[21] https://www3.epa.gov/pesticides/chem_search/ppls/094424-00001-20201217.pdf.

[22] EPA, Restrictions on Rodenticide Products. http://www2.epa.gov/rodenticides/restrictions-rodenticide-products

[23] C.T. Eason, M. Wickstrom, R. Henderson, L. Milne and D. Arthur, 2000. Non-target and secondary poisoning risks associated with cholecalciferol. *New Zealand Plant Protection 53:299-304.* Risk of secondary poisoning exists, though it is lower than from other rodenticides. TR lines 300-305.

[24] TR lines 263-272; 301-303; 323-335; 341-352.

[25] Eason, C.T., Wickstrom, M., Henderson, R., Milne, L. and Arthur, D., 2000. Nontarget and secondary poisoning risks associated with cholecalciferol. *New Zealand Plant Protection*, *53*, pp.299-304.

[26] TR lines 375-383; 388-396.

[27] TR lines 398-428.

Vitamin D_3 is incompatible with organic production.
Besides the hazards it poses to nontarget animals, vitamin D_3 is a cruel means of killing rodents. "Following oral ingestion, vitamin D3 accumulates in the liver. Following ingestion, the induction of calcium mobilization occurs, which can result in hypercalcemia and mineralization of major organ. An increase in the calcium level results in mobilization of calcium, which circulates dissolved in the blood plasma. An elevated level of the crystals of calcium salts can cause mineralization of major organs. Mineralization results in tissue damage and can cause heart problems and possibly kidney failure. Tissue damage caused hypercalcemia and mineralization of major organs leads to death in rodents."[28]

Vitamin D_3 does not meet the OFPA criteria of absence from harm to health and the environment, essentiality, or compatibility, and should be delisted.

Aquatic plant extracts

205.601(j) As plant or soil amendments (1) Aquatic plant extracts (other than hydrolyzed)—Extraction process is limited to the use of potassium hydroxide or sodium hydroxide; solvent amount used is limited to that amount necessary for extraction.

Aquatic plant extracts pose environmental hazards. The hazards to the environment depend on the particular product. Some products use sodium hydroxide and may lead to salt build up from use. Conversely, those products that are not neutralized may harm plants. Environmental contamination can result from improper disposal of alkalis used in extraction. Overuse may lead to eutrophication in streams receiving runoff. Overharvesting of seaweeds may occur.[29]

We are glad to see that there has been in the past near unanimous support for addressing the environmental impacts of the use of marine algae in organic production. The protection of marine ecosystems is urgently needed and required as a part of the determination on allowed materials under the organic statute. Since marine plants are crucial to ecosystems, it is important for all of us, as organic producers, consumers, certifiers, and regulators, to find a way to move this process forward as quickly as possible. However, NOP has failed to move forward with NOSB recommendations to protect marine ecosystems.

Meanwhile, synthetic aquatic plant extracts can be allowed to sunset. Synthetic aquatic plant extracts are unnecessary. The aquatic plant extracts allowed by this listing are synthetic. According to the Technical Review, natural extracts are available. In addition, the following natural products may be used: manure, blood meal, bone meal, compost, feather meal, guano, compost tea, and other nonsynthetic animal or plant products.[30] Alternative practices include

[28] TR lines 117-122.
[29] TR lines 254-262; 275-277.
[30] TR lines 335-339.

use of compost, cover crops, and manure, in addition to reduced tillage, avoiding compaction, and maintaining soil cover with plants and/or mulches.[31]

Synthetic aquatic plant extracts are incompatible with organic practices. Synthetic aquatic plant extracts do not fit into any of the categories of OFPA §6517(c)(1)(B)(i) of allowable synthetic inputs. Synthetic aquatic plant extracts are a synthetic product, with nonsynthetic versions available, as well as natural alternative materials and methods. They are synthetic growth promoters.[32]

Lignin sulfonate

205.601(j) As plant or soil amendments. (4) Lignin sulfonate - chelating agent, dust suppressant.

The use of lignin sulfonate as a chelating agent and dust suppressant does not meet the requirements of OFPA.

Lignin sulfonate manufacture and use results in environmental damage.

Lignin sulfonate is a by-product of paper pulping. Pulp and paper is the third-largest industrial polluter to air, water, and land in both Canada and the United States, and releases well over 100 million kg of toxic pollution each year.[33] Lignin sulfonates used as dust suppressants or in chelates applied as plant nutrients to the soil may contaminate waterways via runoff following a rain event, resulting in high biological oxygen demand in decomposing, which depletes oxygen for aquatic animals. The use of large amounts of lignin sulfonate can acidify the soil.[34]

Lignin sulfonate is not necessary.

Magnesium chloride is a natural substance that may be used for dust suppression, and nonsynthetic amino acids and citric acid may be used as chelation agents.[35] Dust may also be controlled by vegetative cover, windbreaks, mulch, sprinkling with water; stone or gravel on roads, or surface roughening at angles perpendicular to prevailing winds.[36] And, according to the Technical Review, “Naturally-occurring chelates in the soil include humates, fulvates, and organic root exudates. Fulvates and humates are found naturally in most soils as the result of the decomposition of organic matter. Management practices, including no-till farming or manure applications, can increase organic matter in the soil and thereby increase the rate of naturally-occurring chelates.”[37]

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[31] TR lines 362-364.
[32] TR lines 287-290.
[33] TR lines 239-258.
[34] TR lines 332-337.
[35] TR lines 498-547.
[36] TR lines 567-575.
[37] TR lines 585-590.

Lignin sulfonate is incompatible with organic practices.

Lignin sulfonate is a synthetic material that is used in place of sound organic practices such as creation of hedgerows/windbreaks, mulching, vegetative cover, and building organic soil through the introduction of compost. The alternative practices also serve to support biodiversity on the farm.

Conclusion

Since the listing lignin sulfonate for dust suppression and chelation does not meet any of the OFPA criteria, including not harmful to health and environment, essential to production or handling, and compatible with organic practices, we recommend that it be removed from the National List.

Fatty alcohols (C_6, C_8, C_{10}, C_{12})

§205.601(k) Fatty alcohols (C6, C8, C10, and/or C12)—for sucker control in organic tobacco production.

Fatty alcohols were petitioned as a synthetic growth regulator for sucker control on organic tobacco. Beyond Pesticides opposes this listing because fatty alcohols pose health and environmental hazards, are not needed, and are inconsistent with organic production.

Fatty alcohols pose health and environmental risks.

Manufacture poses risks to aquatic organisms. Fatty alcohols are high production volume chemicals. They exceed capacity of wastewater treatment systems to remove them, and are thus found in effluents, where they are toxic to aquatic organisms.[38]

Application is also hazardous to terrestrial and aquatic organisms. Fatty alcohols are applied as a spray. Most would be expected to volatilize and most (up to C11) be degraded quickly, but longer chains reaching water resist hydrolysis, where they may bioaccumulate and are toxic to aquatic organisms.[39] In the terrestrial environment, the Technical Review (TR) finds that there is a potential for sublethal effects on Lepidopteran insects: "[G]iven that aliphatic alcohols can be used as Lepidopteran sex inhibitors, there is a potential for sublethal (e.g., reproductive) effects on non-target Lepidopterans, such as butterflies."[40] The TR also says that fatty alcohols "may produce short term toxicity to many organisms."[41]

Human health effects include severe and sometimes irreversible eye irritation and slight to moderate skin irritation. The reentry interval, based on Tox category 1 eye irritation, is 48 hours. Personal Protective Equipment is required. The mode of toxicological action is unknown.[42]

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[38] TR lines 294-299; 320-324.
[39] TR lines 303-308; 318.-324
[40] TR lines 327-330.
[41] TR lines 348-350.
[42] TR lines 394-409.

In terms of the impact on soil and the agroecosystem, the TR finds that the product may produce short-term toxicity to many organisms.[43] In addition, in the 1960s, similar products were investigated for their ability to make soil water repellent.[44]

Fatty alcohols are not essential for organic production.

The TR identifies manual topping and suckering, in addition to these alternative materials: indoleacetic acid (a nonsynthetic growth regulator permitted for use on organic crops[45]) at 10,000 ppm applied in lanolin, mineral oil, 10% neem oil, 20% mohua oil, and 25% groundnut oil, applied to each plant after topping. Methyl caprate, which may be produced by fermentation, has been used effectively for topping and suckering.[46]

Fatty alcohols are not consistent with organic production.

As noted by the TR, growth regulators –and hence fatty alcohols–do not fall into any of the OFPA categories of §6517(c)(1)(b)(i).

Conclusion

Please delist fatty acid alcohols because they pose health and environmental hazards, are not essential, and are inconsistent with organic production.

Sodium silicate

205.601(l) As floating agents in postharvest handling. Sodium silicate - for tree fruit and fiber processing.

Sodium silicate, also known as waterglass, is a soluble form of glass. It is used to adjust the specific gravity in flotation tanks for pears. Historically, it was used as a preservative for eggs, filling pores and preventing eggs from degrading. It is not clear whether sodium silicate might have a similar effect on pears. Is it rinsed off, or does it remain in the pores of the pear skin? Sodium silicate has few health and environmental impacts, which are mainly due to the effects of the alkalinity of the solution in the case of a spill or misuse. There are alternative materials, some of which are nonsynthetic, as well as floatless systems, as discussed in the Organic Trade Association petition to remove lignin sulfonate from the National List for the flotation use.

The use for fiber processing did not receive much attention in the Technical Review. Its health impacts on workers and essentiality for that use are not clear. The summary by the Crops Subcommittee did not mention this use or ask questions about it.

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[43] TR lines 348-350.

[44] Kolp, D.G., Krause, F.P. and Lange, W., 1966. Effect of tallow alcohol added to soil on the tension, flow, and evaporation of soil water. *Water Resources Research*, *2*(2), pp.213-222.

[45] https://www.omri.org/ubersearch/results/Indoleacetic%20acid.

[46] TR lines 459-468.

Spills of sodium silicate can pose environmental hazards. Its use in fiber production may cause health effects to workers.

Spills or release into water sources can result in imbalance of silicate to nitrogen and phosphorus and increased pH.[47] Worker exposure during mixing, disposal, and handling of fiber may result in injury.[48]

Sodium silicate is not necessary.

As stated in the Technical Review and the petition to remove lignin sulfonate submitted by the Organic Trade Association, there are several alternative materials available, including some natural materials. Floatless systems are also in use.[49]

Sodium silicate is incompatible with organic production.

Sodium silicate does not fit into any category of OFPA §6517(c)(1)(B)(i). It is not clear whether it is a synthetic preservative. It is a synthetic material that is not needed in organic production.

Conclusion

Sodium silicate should be delisted for its use in floating pears because it does not meet the OFPA criteria of absence of harm to human health and the environment, essentiality, and compatibility with organic production. The Crops Subcommittee must collect and evaluate information concerning the use of sodium silicate in fiber processing. Without support for that use, it should also be delisted.

EPA List 4 - Inerts of Minimal Concern

205.601(m) As synthetic inert ingredients as classified by the Environmental Protection Agency (EPA), for use with nonsynthetic substances or synthetic substances listed in this section and used as an active pesticide ingredient in accordance with any limitations on the use of such substances. (1) EPA List 4 – Inerts of Minimal Concern.

The CS has captured the essence of the issue concerning "inert" ingredients in the first paragraph of its discussion:

> Inerts are not necessarily biologically or chemically inert. They may be relatively benign or may be documented as harmful to the environment or human health. Without a way to individually evaluate each substance listed on EPA List 4 or to evaluate substances as a group, it is difficult to discern the acceptability of each substance for use in organic agriculture.

Active ingredients in pesticide products have been carefully screened to ensure that they meet the requirements of OFPA. Because of the thorough investigation by the NOSB and the additional scrutiny given by the public in written and oral comments, the active ingredients

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[47] TR lines 320-325; 348-355; 357-360.

[48] TR lines 369-387.

[49] TR lines 397-413. OTA petition to remove lignin sulfonate.

that are allowed in organic agriculture present little hazard to people and ecosystems, from their manufacture through their use and disposal.

So-called "inert" ingredients, on the other hand, have not received the same level of scrutiny to ensure that they meet OFPA standards. Reliance on the registration of pesticide products with "inert" ingredients by the U.S. Environmental Protection Agency does not ensure that the standards of OFPA are met, given that the reviews and use allowances under the agency's authorizing legislation (the Federal Insecticide, Fungicide and Rodenticide Act—FIFRA) are based on different, and often incompatible, standards. In addition, "inert" ingredients make of the largest part of many pesticide product formulations. As a result, the most hazardous part of pesticide products used in organic production is often these ingredients.

The NOSB recognizes these facts and has sought to address them. But so far, NOP has failed to follow through.

And now, as "List 4 inerts" are up for sunset review, NOP has still not issued a notification to manufacturers and users of products with a request for information on current inert ingredients in use. This 'data call-in notice' was intended to capture "inert" ingredients that may not be on the comprehensive list of priority "inert" ingredients and "minimal risk" substances eligible for registration under FIFRA section 25(b) used in formulations allowed in organic production. **The notice is overdue and should be issued without further delay.**

Since, as stated above, so-called "inert" ingredients likely pose more hazards than other materials used in organic production, their review deserves a higher priority than it is being given by NOP. These comments urge that the NOSB raise the priority level of "inerts" review to ensure compliance with the law.

We request that all substances not on EPA's 25(b) list falling under the "List 4 inerts" listings be annotated with expiration dates.

Conclusion

Delist List 4 "inerts."

Replace the language at sections 205.601(m) and 205.603(e) with:
As synthetic other ("inert") ingredients in pesticide formulations as classified by the Environmental Protection Agency (EPA) for use with nonsynthetic substances or synthetic substances listed in this section that are used as an active pesticide ingredient in accordance with any limitations on the use of such substances.
(i) Substances permitted for use in minimal risk products exempt from pesticide registration under FIFRA section 25(b);
(ii) "Inert" ingredients that are exempt from the requirement of a tolerance under 40 CFR 180.1122 – for use only in passive pheromone dispensers;

(iii) [List of all "inerts," except the "minimum risk" 25(b) substances, known to be used in organic production, as determined by the Inerts Working Group, each annotated with an expiration date between June 27, 2021 and June 27, 2026.
(ii) Reserved (for list of approved other ("inert") ingredients, with expiration dates until reviewed individually.)

The APEs/NPEs should be removed from the list, as previously recommended by the NOSB. This approach will allow the board to systematically review the "inerts" in groups over a five-year period, an approach the board has previously adopted unanimously.

Paper

205.601(o)(2) Paper-based crop planting aids as defined in §205.2. Virgin or recycled paper without glossy paper or colored inks.

§ 205.2 says, "*Paper-based crop planting aid.* A material that is comprised of at least 60% cellulose-based fiber by weight, including, but not limited to, pots, seed tape, and collars that are placed in or on the soil and later incorporated into the soil, excluding biodegradable mulch film. Up to 40% of the ingredients can be nonsynthetic, other permitted synthetic ingredients in § 205.601(j), or synthetic strengthening fibers, adhesives, or resins. Contains no less than 80% biobased content as verified by a qualified third-party assessment (*e.g.,* laboratory test using ASTM D6866 or composition review by qualified personnel)."

While we very much want to allow organic growers to take advantage of paper pot systems without violating the values central to organic and the standards of the law, we believe that paper as allowed in "paper-based planting aids" is likely to be worse (in terms of environmental and health impacts) than paper that is previously allowed in mulch and compost. However, now that more information is available, all paper needs to be judged according to the criteria in the Organic Foods Production Act (OFPA).

Paper in Organic Production

We find it necessary to put this discussion into a broader context.

Many things have changed since the passage of the Organic Foods Production Act (OFPA). Organic production has grown, and the size of many organic growing operations has grown. The way materials on the National List are used has changed—and many growers have become more dependent on those added synthetics. In addition, the materials themselves have changed. All these changes are manifested in newspaper, other recycled paper, and other uses of paper.

Mulches

Natural organic mulches should be the norm in organic production. The use of natural organic materials in compost and mulch is foundational to organic. In 2001, the National Organic Standards Board (NOSB)[50] gave this definition:

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

The NOSB went on to say that, among other things, an organic production system is designed to: "optimize soil biological activity;" "utilize production methods and breeds or varieties that are well adapted to the region;" "recycle materials of plant and animal origin in order to return nutrients to the land, thus minimizing the use of non-renewable resources;" and "minimize pollution of soil, water, and air." The use of natural mulches—including cover crops—contributes to all of these values.

Organic production systems are also intended to mimic natural ecosystems. In natural systems, plants are fed by the action of soil organisms breaking down plant residues and excreting substances that are plant nutrients. Natural mulches provide a steady diet of organic matter for those soil organisms. This function is one way that we can judge the compatibility of synthetic mulches with organic values.

Newspaper and Other Recycled Paper

When OFPA was passed, and when the first NOSB was working on the first rule, organic growers saw newspapers as a natural, or nearly natural, solution to difficult mulching situations. In those cases, newspaper or other repurposed paper could be combined with other natural mulches to provide a more impermeable layer between plants—a layer that would decompose, adding organic matter to the soil, thus enhancing soil biological activity. It was also seen as recycling plant-based material in order to return nutrients to the land, thus minimizing the use of non-renewable resources.

When newspaper was first evaluated for the National List in 1995, it was seen as basically wood pulp with additives. The additives in black ink were considered to be mostly innocuous, while colored inks and glosses were prohibited because of the hazards they posed. The listing of recycled paper was a fulfillment of the value that organic agriculture should "recycle materials of plant and animal origin in order to return nutrients to the land, thus minimizing the use of non-renewable resources."

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[50] NOSB Principles of Organic Production and Handling. NOSB Recommendation Adopted October 17, 2001.

Now fast-forward to the 2017 TR on newspaper and other recycled paper. Although being mostly composed of cellulose, starch, and lignin, the TR finds:[51]

> 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. Newspaper and other printed matter have inks, dyes and toner (a solid powder used for electrostatic or electrophoretic printing). Most ink in newsprint and office paper is black, but colored inks and dyes are used on various printed material and packaging. With the advent of color printing processes, more newspapers and office paper applications involve colored ink. More printing is done with colored toner as well. Some papers do not use inks or toner for printing. Thermal paper changes color when heat is applied. 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.

No longer can paper be regarded as "basically wood pulp." However, while it is still valuable to keep newspaper and other paper out of the waste stream, where it is still the largest category of municipal solid waste, more fundamental than the issue of balancing resource recovery against potential soil contamination is the issue of whether these uses of paper meet OFPA criteria: Are these uses of paper harmful to human health or the environment, taking into account their entire life cycle? Are they "necessary to the production or handling of the agricultural product because of the unavailability of wholly natural substitute products"? Are they "consistent with organic farming and handling"?

As every Technical Review and NOSB review has stated, there are many natural materials that can be used as mulch. In addition, weed control alternatives include "cultivation, living mulches, hand weeding, flame weeding, crop rotation, and biological control of weeds." For the use of newspaper or other recycled paper to meet the criterion of necessity—as opposed to convenience—it would be required not only that other sources of mulching materials be unavailable, but also that other means of weed control be unavailable.

Paper manufacture

The manufacture of paper pots begins with the manufacture of kraft paper. The TR summarizes environmental impacts of paper production:

> The environmental impacts of manufacturing virgin paper are considered to be significantly greater than recycling paper (Roberts 2007; Martin and Haggith 2018). Harvesting trees to make virgin pulp and paper predictably results in soil erosion and water sedimentation through road-building activity, exposure of bare soil, and accelerated water runoff (Corbett, Lynch, and Sopper 1978; Croke and Hairsine 2011; Anderson and Lockaby 2011). While forestry best management practices (BMPs) may

[51] 2017 TR, Newspaper or Other Recycled Paper. Lines 51-63.

mitigate these effects, BMPs are not always implemented and there are still environmental quality concerns that have not been addressed by BMPs (Anderson and Lockaby 2011). Reduction of forest disturbance by recycling is seen as an environmental benefit (Villanueva and Wenzel 2007). One ton of virgin kraft paper requires 4.4 tons of trees to produce; the same amount of recycled kraft paper requires 1.4 tons of recovered paper to produce (Roberts 2007).

The ability of the forest to sequester carbon is curtailed by harvest (Martin and Haggith 2018). Additionally, recycling waste paper consistently uses less energy and results in fewer greenhouse gas emissions compared with landfilling or incinerating it (Björklund and Finnveden 2005; Villanueva and Wenzel 2007; US EPA 2011; Ghinea et al. 2014). Agricultural by-product sources of pulp fiber can mitigate the adverse impacts of the reliance on wood from forests (USDA 2017; Martin and Haggith 2018). However, the workers who are making the paper pots are more likely to be exposed to chemicals that have adverse health effects than the farmers and farmworkers using the paper pots or those who eat the food grown from the transplants.

Recycled paper products generally have greater contaminant content than virgin paper (Biedermann and Grob 2010; Blechschmidt et al. 2012; Rosenmai et al. 2017). Inks, dyes, and other chemicals not applied to virgin paper will still be present in recycled paper, with only the highest grades of recycled papers being free of impurities and contaminants (Blechschmidt et al. 2012). Recycled paper can include a wide variety of chemical contaminants that are either not present or found at much lower levels in virgin paper. These include heavy metals that may be used in inks and dyes; synthetic polymers used in gloss and as reinforcement; and various adhesives, including the ones being considered in this Technical Review (Borchardt 2006).[52]

The 2017 TR on newspaper and other recycled paper goes into greater depth concerning discharges from manufacture:

Pulp and paper manufacturing has a history of being a heavy polluter of water and air. Effluents from paper manufacturing include the chemical treatments used in the pulping process, dyes, fillers and bleaches (Hamm 2012). Pulp and paper facilities are regulated in the United States as point sources of water pollution under the Clean Water Act. As such, they are required to obtain permits for the discharge of effluents into water, to limit those effluents according to the permit, and to be subject to monitoring and fines by the EPA [40 CFR 430]. The effluent limits are technology based. Some of the treatments and reaction products may be classified as toxic pollutants subject to the Toxics Release Inventory program of EPA, including dioxins and furans (U.S. EPA 2006). Heavy metals are also discharged into water. In most years, pulp and paperboard manufacturing has been one of the top industrial sources of lead, cadmium and mercury released into Canadian water (Environment and Climate Change Canada 2016).

[52] Paper Pots and Containers TR, 2019. Lines 601-631.

> Pulp and paper mills generally use wood and waste paper as fuel, releasing carbon dioxide into the atmosphere and contributing to greenhouse gas emissions. In the United States, pulp and paper mills are considered stationary sources of air pollution and are subject to EPA regulation under the Clean Air Act [40 CFR 63]. In addition to greenhouse gases, paper mills also emit hazardous air pollutants (HAPs) that are generated as part of the pulping and chemical treatment of paper. The highest emitted HAPs from pulp and paper mills in 1996 were acrolein, acetaldehyde, o-cresol, carbon tetrachloride, chloroform, cumene, formaldehyde, methanol, methylene chloride, methyl ethyl ketone, phenol, propionaldehyde, 1,2,4-trichlorobenzene, and o-xylene (U.S. EPA 2001). The HAPs are produced by both the sulfite and Kraft processes, as well as by various treatments such as bleaching.

Virgin Paper, Paper Production Aids

In August of 2018, the NOSB received a petition to add chain paper pots to the National List for growing and transplanting plants. This petition introduced a number of new issues for consideration:

- The use is not for mulching or composting, but as a pot that would be placed in the ground along with the transplant.
- Although paper pots are not necessary, the chain paper pot system allows transplanting in a relatively low-tech process (without motorized propulsion) that saves the grower much tedious work.
- The paper, as petitioned, contains synthetic ingredients that are not on the National List, but which do occur in recycled paper that is currently allowed.
- The paper is not recycled, but is virgin paper, produced from unbleached Kraft pulp and adhesives. Non-paper synthetic fibers have been used up to 15% in the paper pots, but the manufacturer has proposed that these fibers be replaced by a natural hemp fiber. (The definition adopted by the NOSB and NOP says, "Up to 40% of the ingredients can be nonsynthetic, other permitted synthetic ingredients in § 205.601(j), or synthetic strengthening fibers, adhesives, or resins.")
- Some of the ingredients may not be biodegradable.
- The Crops Subcommittee also considered expanding the listing to other uses of paper.

From an environmental perspective, the most significant aspect of the paper pots petition is the use of virgin paper. Using recycled paper as a farm input does add a number of synthetic chemicals—not all known—to the farm. However, the use of virgin paper has far-reaching environmental impacts. As summarized by the 2019 TR,[53]

> The environmental impacts of manufacturing virgin paper are considered to be significantly greater than recycling paper. Harvesting trees to make virgin pulp and paper predictably results in soil erosion and water sedimentation through road-building activity, exposure of bare soil, and accelerated water runoff. While forestry best

[53] TR Paper Pots and Containers, 2019. Lines 601-622; 675-678.

management practices (BMPs) may mitigate these effects, BMPs are not always implemented and there are still environmental quality concerns that have not been addressed by BMPs. Reduction of forest disturbance by recycling is seen as an environmental benefit. One ton of virgin kraft paper requires 4.4 tons of trees to produce; the same amount of recycled kraft paper requires 1.4 tons of recovered paper to produce.

The ability of the forest to sequester carbon is curtailed by harvest. Additionally, recycling waste paper consistently uses less energy and results in fewer greenhouse gas emissions compared with landfilling or incinerating it. Agricultural by-product sources of pulp fiber can mitigate the adverse impacts of the reliance on wood from forests. However, the workers who are making the paper pots are more likely to be exposed to chemicals that have adverse health effects than the farmers and farmworkers using the paper pots or those who eat the food grown from the transplants.

The harvest of trees results in the loss of soil and water-holding capacity in forests and reduces atmospheric carbon sequestration. Biomass cultivation can result in potential loss of biodiversity, soil carbon depletion, increased soil erosion, deforestation, and increased greenhouse gas emissions."

Virgin paper from wood pulp is not acceptable.

As far as we have been able to determine, virgin paper has not previously been allowed or petitioned for use in organic production. The allowed paper was, consistent with organic principles, organic material that is removed from the waste stream, which allows the NOSB to ignore the impacts of paper manufacture that are outlined above. If, instead, virgin paper is used—especially virgin paper made from wood pulp—then the NOSB must take into account these sizeable environmental impacts.

The petitioner suggested that hemp could replace tree pulp, which would reduce the impacts of harvesting trees, but would add impacts of agricultural hemp production. Those impacts have not been assessed in the Technical Reviews. However, other authors have assessed the environmental impacts of hemp production and found them to be smaller in terms of input requirements and discharges than other major crops, while yielding higher quantities of dry matter.[54] The petition states that non-bleached kraft paper is used in the Nitten pots, which is significant, due to the contribution of chlorine bleach and its reaction products to the effluent stream.

Additives

Wood or hemp pulp is cellulose and readily degrades in the soil. Paper pots may also contain strengtheners, reinforcement fibers, adhesives, and antimicrobials.

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[54] Werf, H., 2004. Life Cycle Analysis of field production of fibre hemp, the effect of production practices on environmental impacts. *Euphytica*, *140*.

The strengtheners cited in the petition are magnesium chloride, which is considered to be nonsynthetic, and the urea resin dimethylol dihydroxy ethylene urea (DMDHEU). DMDHEU is a resin that is also used in permanent press fabrics, where it is known as a formaldehyde-releasing substance that may cause formaldehyde-allergic reactions.[55] Aside from the dermal sensitivity, DMDHEU is considered to have low acute toxicity.[56] It is suspected by the European Union of causing cancer through inhalation exposure and mutations.[57] It does not bioconcentrate, and its biodegradation half-life is 4.67 days.[58] The petition says, "The new line of paper pot products (which are the focus of this petition) will replace one of the synthetic ingredients in the paper with a natural substitute: hemp fiber." This refers to vinylon, so apparently the DMDHEU will remain. Urea-formaldehyde resin is allowed in paper and paperboard used in food packaging. [59]

The petition says that the adhesives used in paper pots are ethylene vinyl acetate (EVA) resin, polyvinyl acetate resin (PVAc), and acrylic acid ester (AAE) copolymer. An adhesive related to these is polyvinyl alcohol (PVA), to which PVAc is readily degraded. All three are used for food contact surfaces and/or food packaging.[60] PVA, EVA, PVAc, and magnesium chloride are all on EPA List 4B, Minimum Risk Inert Ingredients.[61]

Fiber reinforcement may also be added. In consideration of the petition, Nitten said it would substitute hemp fiber for vinylon in the new line of pots—although the CS reported at the time that substitution had not so far been successful. This should be investigated in the sunset review.

The final—and most objectionable—additives are antimicrobials. These would not be allowed in packaging for organic foods, according to OFPA §6510(a)(5). Nitten certified that their pots do not contain any fungicides, preservatives, or fungicides. Again, this needs to be investigated for all allowed paper-based crop planting aids.

While the Nitten pots at the time of the listing did not contain any additives that could not be found in organic food by virtue of presence on food contact surfaces or food packaging, it is not clear whether that is the case for the paper-based crop planting aids now allowed. This also should be investigated by the CS.

The remaining issue is the extent to which these additives biodegrade in the soil.

[5555] De Groot, A.C., Le Coz, C.J., Lensen, G.J., Flyvholm, M.A., Maibach, H.I. and Coenraads, P.J., 2010. Formaldehyde-releasers: relationship to formaldehyde contact allergy. Part 2. Formaldehyde-releasers in clothes: durable press chemical finishes. *Contact Dermatitis*, *63*(1), pp.1-9.

[56] https://comptox.epa.gov/dashboard/dsstoxdb/results?search=DTXSID1025140#toxicity-values.

[57] https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/notification-details/25960/745920.

[58] https://comptox.epa.gov/dashboard/dsstoxdb/results?search=DTXSID1025140#env-fate-transport.

[59] Paper Pots and Containers TR, 2019. Table 2. FDA Status of Selected Paper Additives.

[60] Paper Pots and Containers TR, 2019. Table 2. FDA Status of Selected Paper Additives.

[61] Paper Pots and Containers TR, 2019. Line 115.

Microplastics

Scientists are increasingly concerned about the impacts of microplastics—plastic fragments less than 5 mm in size in size—on a wide range of organisms. Although concerns were first raised about microplastics in the marine environment, impacts on terrestrial organisms are increasingly documented.

A major source of microplastics in surface water is wastewater treatment plants. Although microplastics in soil have been less studied, presumably, microplastics in soil make their way in runoff to surface water. Agricultural soils may receive microplastics from sludge/compost fertilization, plastic mulches, and wastewater irrigation.[62]

Microplastics can cause harmful effects to humans and other organisms through physical entanglement and physical impacts of ingestion. They also act as carriers of toxic chemicals that are adsorbed to their surface. Some studies on fish have shown that microplastics and their associated toxic chemicals bioaccumulate, resulting in intestinal damage and changes in metabolism.[63] Soil organisms and edible plants have been shown to ingest microplastic particles.[64] Earthworms can move microplastics through the soil, and microplastics can move through the food chain to human food.[65] Microplastics can have a wide range of negative impacts on the soil, which are only beginning to be studied, but include reduction in growth and reproduction of soil microfauna.[66] When looking at the impact of microplastics, it is important to include the impact of associated substances. As noted above, they can carry toxic chemicals. A review by Zhu et al. cites several studies showing, "[M]icroplastics can serve as hotspots of gene exchange between phylogenetically different microorganisms by introducing additional surface, thus having a potential to increase the spread of ARGs [antibiotic resistance genes] and antibiotic resistant pathogens in water and sediments." [67]

Back to Paper

The consideration of microplastics should remind us that both recycled paper and virgin paper used in paper planting aids often contain polymers. These polymers—including polyethylene, polyacrylimides, and polyesters[68]—which may persist after the degradation of the cellulose and lignin from wood pulp, are microplastics and present similar hazards to the microplastics discussed above.

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[62] Zhu, F., Zhu, C., Wang, C. and Gu, C., 2019. Occurrence and ecological impacts of microplastics in soil systems: a review. *Bulletin of environmental contamination and toxicology*, *102*(6), pp.741-749.
[63] Li, J., Liu, H. and Chen, J.P., 2018. Microplastics in freshwater systems: A review on occurrence, environmental effects, and methods for microplastics detection. *Water Research*, *137*, pp.362-374.
[64] Zhu, F., Zhu, C., Wang, C. and Gu, C., 2019. Occurrence and ecological impacts of microplastics in soil systems: a review. *Bulletin of environmental contamination and toxicology*, *102*(6), pp.741-749.
[65] He, D., Luo, Y., Lu, S., Liu, M., Song, Y. and Lei, L., 2018. Microplastics in soils: analytical methods, pollution characteristics and ecological risks. *TrAC Trends in Analytical Chemistry*, *109*, pp.163-172.
[66] He, D., Luo, Y., Lu, S., Liu, M., Song, Y. and Lei, L., 2018. Microplastics in soils: analytical methods, pollution characteristics and ecological risks. *TrAC Trends in Analytical Chemistry*, *109*, pp.163-172.
[67] Zhu, F., Zhu, C., Wang, C. and Gu, C., 2019. Occurrence and ecological impacts of microplastics in soil systems: a review. *Bulletin of environmental contamination and toxicology*, *102*(6), pp.741-749.
[68] 2017 TR, Newspaper or Other Recycled Paper. Lines 21-216.

Biodegradability of Additives in Pots

PVA/PVAc

PVAc is commonly known from its use in Elmer's Glue-All.[69] It is related to polyvinyl alcohol (PVA) in that PVA is manufactured from PVAc by hydrolysis. The TR says, "Natural degradation of PVA can be readily 100 percent biodegradable in 30 days under ideal conditions."[70] Other authors state, "PVA is an outstanding example showing that conditions are crucial for biodegradation. Quantitative degradation is described in wastewater treatment plants run with an activated sludge containing an adapted microbial population; however, the biodegradation rate decreases significantly in systems lacking such a prepared microbial population. This must be kept in mind because degrading organisms or communities are not evenly distributed in all biotopes."[71]

Unfortunately, details about the rate of degradation of PVAc are harder to determine. PVAc is degraded by fungi—specifically, it is known to be degraded by *Aspergillus* spp. and *Penicillium* spp.[72] Both fungal genera are ubiquitous and found in soil environments.[73] Vinyl acetate, the monomer of PVAc, is subject to microbial degradation to acetate and acetaldehyde.[74]

EVA

The only information about the biodegradability of EVA we have found is this statement of purpose in a research paper: "The purpose of this work was to prepare biodegradable copolymers using a non-biodegradable (ethyl vinyl acetate) and biodegradable polymers (polylactic acid), in order to obtain biodegradable copolymers."[75]

AAE Polymer

The Hazardous Substances Data Bank says the following, "In the semi-continuous activated sludge test for inherent biodegradability, [acrylic acid polymer] (mean molecular weight of 4,500) removal was 40% (incubation time not specified); using a continuous-feed activated sludge test, removal was 27%." No information was available for the identifying CAS number given in the petition. This was for acrylic acid polymer, CAS # 9003-01-4.

Conclusion

As we stated at the beginning of these comments, this decision should be based on compliance with OFPA criteria. The CS should investigate the paper-based crop planting aids

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[69] Paper Pots and Containers TR, 2019. Lines 161-163.

[70] Paper Pots and Containers TR, 2019. Line 481.

[71] Amann, M. and Minge, O., 2011. Biodegradability of Poly (vinyl acetate) and Related Polymers. In *Synthetic Biodegradable Polymers* (pp. 137-172). Springer, Berlin, Heidelberg.

[72] Trejo, A.G., 1988. Fungal degradation of polyvinyl acetate. *Ecotoxicology and environmental safety*, *16*(1), pp.25-35.

[7373] https://drfungus.org/knowledge-base/aspergillus-species/; https://drfungus.org/knowledge-base/penicillium-species/.

[74] Nieder, M., Sunarko, B. and Meyer, O., 1990. Degradation of vinyl acetate by soil, sewage, sludge, and the newly isolated aerobic bacterium V2. *Appl. Environ. Microbiol.*, *56*(10), pp.3023-3028.

[75] Moura, I., Machado, A.V., Nogueira, R. and Bounor-Legare, V., 2010. Synthesis of biodegradable copolymers based on ethylene vinyl acetate and polylactic acid. In *Materials Science Forum* (Vol. 636, pp. 819-824). Trans Tech Publications.

now in use and develop a proposal that contains an annotation clarifying the materials and manufacturing processes that will be allowed.

Arsenic

§205.602

The following nonsynthetic substances may not be used in organic crop production:
(b) Arsenic.

Arsenic is prohibited by the Organic Foods Production Act (OFPA) 7 U.S.C. §6508(c)(1) CROP MANAGEMENT.—"For a farm to be certified under this title, producers on such farm shall not – (1) Use natural poisons such as arsenic or lead salts that have long-term effects and persist in the environment, as determined by the applicable governing State official or the Secretary."

The Senate Committee report says, "The Committee recognizes that certain natural materials present environmental and health hazards. An example would be the use of arsenic which, although natural, is known to be extremely toxic, and which is therefore explicitly prohibited from use in organic production under this title."

The use of arsenic in organic production is specifically prohibited by OFPA. It is persistent, toxic to humans and other animals, is taken up by plants, and has a wide range of toxic effects. It is unnecesssary in organic production.

Conclusion

Arsenic should remain on §602.

Strychnine

§205.602

The following nonsynthetic substances may not be used in organic crop production:
(i) Strychnine.

Strychnine is highly acutely toxic and has been found to be responsible for secondary poisonings. People affected by strychnine poisoning are not likely to survive. There are numerous alternative materials and practices.

Strychnine cause harm to humans and the environment.

Since strychnine baits are inserted underground, the ability to collect unused bait is small, increasing the likelihood of nontarget poisoning. Strychnine has resulted in secondary poisoning in pets that ate poisoned rodents.[76] Although all animals are susceptible, birds are more often

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[76] National Pesticide Information Center, Rodenticides Topic Fact Sheet. http://npic.orst.edu/factsheets/rodenticides.pdf Accessed 6/23/2014.

affected. For example, species poisoned by strychnine in Michigan are rock dove, cardinal, Canada goose, dark-eyed junco, mallard duck, common grackle, blue jay and house sparrow.[77] People who are severely affected by strychnine poisoning are not likely to survive.[78]

Strychnine is not necessary.

There are many less dangerous materials and methods. They include: trapping, supporting predator habitat, flooding, ecologically-based rodent management,[79] habitat modification,[80] and encouraging predators.[81]

Strychnine is incompatible with organic practices.

Strychnine is highly toxic to humans and other species, causes secondary poisoning, and has many nontarget effects. It does not "promote plant and animal health by enhancing soil physical, chemical, or biological properties."

Conclusion

Strychnine should remain on §602.

Thank you for your consideration of these comments.

Sincerely,

Terry Shistar, Ph.D.
Board of Directors

[77] Michigan Dept. of Natural Resources, Strychnine Poisoning. https://www.michigan.gov/dnr/0,4570,7-153-10370_12150_12220-27278--,00.html Accessed 6/23/2014.

[78] Center for Disease Control and Prevention, 2013. Facts About Strychnine. http://www.bt.cdc.gov/agent/strychnine/basics/facts.asp Accessed 6/23/2014.

[79] Propane TR TR lines 340-367.

[80]http://environmentalchemistry.com/yogi/environmental/200704prairiedogcontrollethal.html; http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7438.html; http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7433.htmlhttp://environmentalchemistry.com/yogi/environmental/200706prairiedogreconciliation.html.

[81] http://people.uleth.ca/~michener/predators.htm. http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7433.html; http://yardener.com/YardenersPlantProblemSolver/DealingWithPestAnimals/Gophers/SolutionsForGophers/DispatchTheGopher.