Sunset 2020 Meeting 2 - Review
Crops Substances §205.601, §205.602
October 2018

Introduction

As part of the Sunset Process, the National Organic Program (NOP) announces substances on the National List of Allowed and Prohibited Substances (National List) that are coming up for sunset review by the National Organic Standard Board (NOSB). The following list announces substances that are on the National List for use in organic crop production that must be reviewed by the NOSB and renewed by the USDA before their sunset date. This list provides the substance's current status on the National List, use description, references to past technical reports, past NOSB actions, and regulatory history, as applicable.

Request for Comments

Written public comments will be accepted through October 4, 2018 via www.regulations.gov. Comments received after that date may not be reviewed by the NOSB before the October meeting.

Note: With the exception of sodium carbonate peroxyhydrate, aqueous potassium silicate, and sulfurous acid, the materials included in this list are undergoing early sunset review as part of November 18, 2016 NOSB recommendation on efficient workload re-organization.

Reference: 7 CFR §205.601 Synthetic substances allowed for use in organic crop production.

Alcohols: Ethanol
Alcohols: Isopropanol
Sodium carbonate peroxyhydrate
Newspaper or other recycled paper
Plastic mulch and covers
Aqueous potassium silicate
Elemental sulfur
Lime sulfur
Sucrose octanoate esters
Hydrated lime
Liquid fish products
Ethylene
Sulfurous Acid
Microcrystalline cheesewax

Reference 7 CFR §205.602 Prohibited nonsynthetic substances

Potassium chloride

Alcohols (ethanol)

Reference: 205.601(a) As algicide, disinfectants, and sanitizer, including irrigation system cleaning systems. (1) Alcohols. (i) Ethanol.

Technical Report(s): 1995 TAP; 2014 TR - Ethanol; 2014 TR - Isopropanol

Petition(s): N/A

Past NOSB Actions: 10/1995 NOSB minutes and vote; 11/2005 NOSB sunset recommendation; 04/2011 NOSB sunset recommendation; 10/2015 NOSB sunset recommendation

Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Sunset renewal notice published 03/21/17 (82 FR 14420)

Sunset Date: 3/15/2022

Subcommittee Review

The United State Environmental Protection Agency (US EPA) regulates all non-food applications of ethanol, including its use as a pesticide and plant growth regulator. According to the Reregistration Eligibility Decision for Aliphatic Alcohols, ethanol and isopropanol were registered in the U.S. as early as 1948 as active ingredients in indoor disinfectants (US EPA, 1995). Approximately 48 ethanol products were registered for use as hard surface treatment disinfectants, sanitizers, and mildewcides as of 2012 (US EPA, 2012a). Ethanol is also the active ingredient in certain plant growth regulator products.

Both fermentation and chemical synthesis procedures are used in the commercial production of ethanol for the preparation of disinfectant solutions, spirits, and industrial fuel sources. There are a variety of methods available for the fermentative production of ethanol from carbon sources such as starch, sugar, and cellulose using natural and genetically engineered strains of yeast or bacteria. Ethanol can also be produced synthetically through the direct or indirect hydration of ethylene and as a by-product of certain industrial operations.

Several international organizations provide guidance on the application of synthetic ethanol in organic crop and livestock production and the processing of organic foods. Among these organizations, there are international regulatory agencies (EU, Canada and Japan) and independent organic guidelines and standards organizations (Codex and IFOAM).

Although ethanol is a volatile organic compound and potentially contributes to the formation of ozone and photochemical smog, large-scale releases of ethanol under the prescribed use pattern in organic crop production are unlikely. Ethanol is readily biodegradable in air, soil, and water. According to the US EPA, ethanol is practically non-toxic based on acute oral and inhalation toxicity tests as well as primary eye and dermal irritation studies.

Public comments were largely in favor of relisting both ethanol and isopropanol because these materials are good examples of why there are several sanitizers and disinfectants listed for organic uses. However, one commenter suggested that the NOSB investigate the availability of non-synthetic ethanol from non-GMO fermentation organisms and feedstock, as well as the availability of organic ethanol. They said the NOSB should ask suppliers the question, “Would you be able to meet the need for non-synthetic/non-GMO and/or organic ethanol if the demand for it were created by eliminating the listing for synthetic ethanol?”

Subcommittee vote
Motion to remove ethanol from 205.601(a)(1)(i) - as algicide, disinfectant, and sanitizer, including irrigation system cleaning based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: N/A
Motion by: Jesse Buie
Seconded by: Harriet Behar
Yes: 0 No: 7 Abstain: 0 Absent: 1 Recuse: 0

Alcohols (isopropanol)

Reference: 205.601(a) As algicide, disinfectants, and sanitizer, including irrigation system cleaning systems. (1) Alcohols. (ii) Isopropanol.
Technical Report(s): 1995 TAP; 2014 TR - Ethanol; 2014 TR - Isopropanol
Petition(s): N/A
Past NOSB Actions: 10/1995 NOSB minutes and vote; 11/2005 NOSB sunset recommendation; 04/2011 NOSB sunset recommendation; 10/2015 NOSB sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Sunset renewal notice published 03/21/17 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review
Isopropanol is used for a variety of industrial and consumer purposes, ranging from chemical and solvent applications to medical and consumer usage. Regarding crop production, isopropanol may be effectively used to decontaminate the lines of irrigation systems as well as a variety of agricultural implements. Alcohols, including isopropanol and ethanol, can provide rapid broad-spectrum antimicrobial activity against vegetative bacteria, viruses and fungi, but lack activity against bacterial spores (McDonnell, 1999).

Chemical synthetic procedures are used in the commercial production of isopropanol that is for the preparation of consumer-use disinfectants, industrial solvents, and specialty chemicals. Specifically, indirect and direct methods for the hydration of petroleum-derived propylene are the two primary commercial processes to produce isopropanol. In addition, smaller amounts of industrial isopropanol are generated through the hydration of acetone over transition-metal catalysts (Papa, 2011; Merck, 2006). A variety of methods are also available for the fermentative production of isopropanol from carbon sources, such as starch, sugar, and cellulose, using genetically engineered yeast and bacteria (Papa, 2011).

A small number of international organizations provide guidance on the application of synthetic isopropanol in organic crop and livestock production as well as the processing of organic foods. Among these are the Canadian General Standards Board and the International Federation of Organic Agriculture Movements (IFOAM).

Although isopropanol is a volatile organic compound and potentially contributes to the formation of ozone and photochemical smog, large-scale releases of isopropanol under the prescribed use pattern in organic crop production are unlikely. Isopropanol may enter the environment because of its manufacture, in addition to its solvent and chemical intermediate uses. According to the U.S. EPA, isopropanol is slightly toxic to practically non-toxic based on acute oral and inhalation toxicity tests as well as primary eye and dermal irritation studies (EPA, 1995).

Public comments were largely in favor of relisting both ethanol and isopropanol because these materials are good examples of why there are several sanitizers and disinfectants listed for organic uses.

Subcommittee vote
Motion to remove isopropanol from 205.601(a)(1(ii) – as algicide, disinfectant, and sanitizer, including irrigation system cleaning based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: N/A
Motion by: Jesse Buie
Seconded by: Emily Oakley
Yes: 0 No: 7 Abstain: 0 Absent: 1 Recuse: 0

Sodium carbonate peroxyhydrate

Reference: 205.601(a) As an algaecide (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.
Technical Report: 2006 TAP; 2014 TR
Original Petition: 2005 Sodium Carbonate Peroxyhydrate
Past NOSB Actions: 11/2007 NOSB recommendation; 11/2007 NOSB Crops Subcommittee Recommendation; 10/2014 NOSB sunset recommendation
Recent Regulatory Background: Proposed rule (including justification) published 6/3/2009 (74 FR 26591). Added to National List 12/13/2010 (75 FR 77521). Sunset renewal notice published 06/19/15 (80 FR 35177).
Sunset Date: 6/22/2020

Subcommittee Review
Sodium carbonate peroxyhydrate is used as an algaecide in rice fields, ponds, ditches, and irrigation lines (TR lines 11-124). It was added to the National List in 2007 with the hope that growers would use it as an alternative to more problematic materials such as copper and chlorine; it has only been registered for use in rice since 2010. The 2014 technical report (TR) states that the material is a precursor to hydrogen peroxide and is used widely in household cleaners and detergents, as well as water bodies (lines 89-100). Sodium carbonate peroxyhydrate is a white granular crystalline powder and is produced by drying hydrogen peroxide in the presence of sodium carbonate. It rapidly dissolves in water and dissociates into hydrogen peroxide and sodium carbonate. It decomposes to leave only water, oxygen, and soda ash (TR lines 51-52 and 79-82).
An emission of sodium carbonate peroxyhydrate to the environment could potentially occur during production, formulation, and use of the substance (TR lines 323-24). Sodium, carbonate, and hydrogen peroxide do not adsorb to sediment (TR line 333). No new concerns were raised about human health or environmental effects since the earlier review in 2006; however, it is highly toxic to bees and it should not be allowed to drift to flowering plants or used when contact with bees might occur (TR lines 395-434).
In 2014, a new TR was commissioned to address alternatives and use patterns. Of the alternatives

presented, copper sulfate is the most problematic and also the most widely used (on 97,757 acres vs. 1,177 acres in California in 2010, representing 17.4 and 0.3% of California rice acreage, respectively) (TR lines 448 - 457). Some of the proposed alternative controls, including Chinese herbs, garlic extracts, or panchagavya and amruthajalam, have not been tested in the U.S. and may not be available (TR lines 487 - 497).

During the Sunset 2015 Review, the NOSB sought input comparing this material with copper sulfate for control of algal scum in rice production and asked if it could replace copper sulfate for that use. Limited and conflicting comments were received. Points raised in favor of renewing the substance stated that it provides better control of algae, and its breakdown components of water and oxygen are more favorable than the accumulation of elemental copper associated with copper sulfate. Additionally, when utilized in irrigation ponds sodium carbonate peroxyhydrate has fewer corrosion issues with irrigation equipment than copper sulfate. Those against renewing the substance stated that it does not fit any OFPA categories, and is not permitted in organic production internationally (TR lines 164-202).

The Crops Subcommittee conducted further investigation into points raised in public comment. In particular, a 2007 report of the California Rice Research Board studied the efficacy of this material and found it did not work well enough to recommend it for rice paddies. Further investigations into controlling algae by the same group in 2013 indicated that management of phosphorus fertilization can influence the severity of algal growth. Reducing phosphate concentrations in rice field water was not mentioned in the 2014 TR but may be a promising alternative practice.

During the spring 2018 meeting, the Crops Subcommittee requested additional information regarding the significantly lower use of sodium carbonate peroxyhydrate as compared to copper sulfate, despite its lower toxicity, as well as information on other applications for which producers are using the material. Relatively little public comment was received regarding this material, and it does not appear to be widely used. Based on public comments, its primary use is as an irrigation and water treatment.

Subcommittee vote

Motion to remove sodium carbonate peroxyhydrate from §205.601 (a) based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: N/A
Motion by: Emily Oakley
Seconded by: Jesse Buie
Yes: 2 No: 5 Abstain: 0 Absent: 1 Recuse: 0

Newspaper or other recycled paper

Reference: 205.601(b) As herbicides, weed barriers, as applicable. (2) Mulches. (i) Newspaper or other recycled paper, without glossy or colored inks.
Reference: 205.601(c) As compost feedstocks—Newspapers or other recycled paper, without glossy or colored inks.
Technical Report: 1995 TAP; 2006 TAP; 2017 TR
Petition(s): N/A
Past NOSB Actions: 10/1995 NOSB minutes and vote; 11/2005 NOSB sunset recommendation; 04/2011 NOSB sunset recommendation; 10/2015 NOSB sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290 Sunset renewal notice published 03/21/17 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review:
At the 2015 NOSB sunset review, it came to the attention of both the NOSB and the public that there are new, less toxic materials used in production of newspaper and other recycled paper products which could stimulate the NOSB to consider a change to the annotation for this material. A technical report (TR) was requested and subsequently completed in summer 2017. The TR revisited the ingredients and colored inks in newspaper as well as their effect on the environment.

While there has been progress towards less toxic materials used in inks, and more recycling of paper products since the original listings and annotation of newspaper and recycled paper, it is difficult to impossible to determine if the inks present in the newspaper are ones that are less problematic. There is no methodology for separation between color inks that might be more acceptable for direct application to organic land and those that are not. When reviewing the 2017 TR, the Crops Subcommittee decided the current annotation for newspaper and recycled paper, which prohibits glossy or colored inks, should remain. This conclusion was presented as an update to the full NOSB at the Fall 2017 NOSB meeting.

There was continued support for this material to remain on the National List with the current annotation. Certifiers, grower groups, and individual growers all submitted comments in favor of retaining this material in both locations on the National List. While some stated there was currently not much use of this material in organic crop production, they also stated it should continue to be allowed for those who wish to continue using it. One certifier noted that newspaper could be included in manure that is cleaned out of livestock barns, supporting the relisting as a compost feedstock.

Subcommittee vote
Motion to remove newspaper or other recycled paper based on the following criteria in the Organic Foods Production Act (OFPA) for both listings:
7 CFR 205.601(b) As herbicides, weed barriers, as applicable. (2) Mulches. (i) newspapers or other recycled paper, without glossy or colored inks.
7 CFR 205.601(c) - As compost feedstocks – newspapers or other recycled paper without glossy or colored inks.
Motion by: Harriet Behar
Seconded by: Asa Bradman
Yes: 0 No: 6 Abstain: 1 Absent: 1 Recuse: 0

Plastic mulch and covers

Reference: 205.601(b) As herbicides, weed barriers, as applicable. (2) Mulches. (ii) Plastic mulch and covers (petroleum-based other than polyvinyl chloride (PVC)).
Technical Report: 1995 TAP
Petition(s): N/A
Past NOSB Actions: 10/1995 NOSB minutes and vote; 11/2005 NOSB sunset recommendation; 04/2011 NOSB sunset recommendation; 10/2015 NOSB sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Sunset renewal notice published 03/21/17 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review

Plastic mulches and covers can be of various thicknesses and can be a film or woven type landscape cloth. Various colors are used for crop production enhancements, such as red to increase tomato fruiting, silver to reflect and deter pests, black to warm the ground, white to cool the soil, clear to "solarize" for weed and pest management and more. Clear and translucent plastics are typically used as coverings for heated greenhouses or unheated high or low tunnels. In the Fall of 2017, the NOSB completed a sunset review of biodegradable bio-based mulch films, a related material. Based on that review, the current annotation and National Organic Program guidance was retained. In addition to the allowance of plastic mulches and covers on the National List, the following statement is included within the regulations:

§205.206(c) Weed problems may be controlled through: (6) Plastic or other synthetic mulches: *Provided,* That, they are removed from the field at the end of the growing or harvest season.

When these plastic mulches/covers are used for perennial crops, many, but not all, organic certification agencies have interpreted the regulations to allow it to remain in place for perennial crop production, as the harvest season is continuous from year to year. Long-term breakdown of the plastic films or plastic woven cloth can occur, especially if not protected from the sun's ultraviolet light.

Plastic mulches and covers are thermoplastic resins of high melt viscosity, usually polyethylene. Resin pellets are melted into an extruder and pumped or blown through a die or tube to form the plastic in the desired shape.

Plastic mulches and covers are used extensively in both organic and nonorganic agriculture and are allowed for use under the EU, Canada and other organic standards. There has been strong support for continued listing of plastic mulch and covers by the organic community at each of the previous sunset dates. This product is used extensively in both organic and nonorganic production systems. When this product is used as a mulch on the soil, it tends to get coated with soil which makes it very difficult to recycle. Much of the plastic mulches and covers removed at the end of the harvest season are sent to a landfill. Greenhouse coverings and other uses of plastic where there is minimal soil attached, can usually be recycled, especially in agricultural regions where companies have specialized in the recycling of these materials. he Crops Subcommittee asked the following questions to obtain public comment for this current sunset cycle on this material:

1. Are there alternative methods or natural materials that could replace the functionality of this petroleum-based material in crop production?
2. Are you aware of plastic mulches (either films or woven cloth) being left in place on the ground for more than 1-2 years and are you seeing degradation? How do you lessen that degradation, or address degradation if it occurs? Are plastic shards or debris found in the soil that cannot be removed?
3. Should woven poly landscape cloth be addressed differently than plastic mulch films? Are there heavier weights and thicknesses of plastic film mulches that are similar to woven poly landscape cloth in its resistance to degradation?
4. When the plastic mulch or cloth is removed, is it piled on the farm, landfilled, recycled or processed in an appropriate manner?

5. Are you aware that burning plastic is illegal in many states due to the release of dioxin and other problematic chemicals into the atmosphere? If burning plastic is an issue in your state or country, would you like to see an annotation banning burning of plastic mulch or covers under the organic regulation?

In response to these questions, the public had very strong support for renewal of plastic mulches, covers and shade clothes with the current annotation. Many supported the addition of an annotation in the future, to ban burning of plastic as a disposal method. Others noted that there are current federal laws as well as state and local authorities who enforce bans on burning plastic and felt the organic regulation should defer to EPA and other governmental authorities on this issue.

Also mentioned in public comment was the issue of sending the plastic to landfills and the environmental concerns associated with this disposal method. At the same time as this issue was discussed, some commenters gave their support for a biodegradable mulch film that was not 100% bio-based, as currently required by the NOP, and instead requested an allowance for biodegradable mulch films that are fossil fuel based. Others mentioned the need to improve and increase the options to recycle agricultural plastics of all types.

Certifiers noted that they allow woven plastic landscape cloth to remain in a perennial crop field for numerous years, but if, at the annual inspection, it is noted that there is degradation, then the plastic cloth must be removed from the field. One advocacy group noted that use of black plastic heats the soil which results in loss of soil biological life, especially when kept in place for many years.

Lastly, one commenter felt the annotation should be changed to limit the use of plastic to situations where hay, straw, or other natural materials were shown to not meet the operator's desired mulch functionality within their organic system.

Subcommittee vote

Motion to remove plastic mulch and covers (petroleum-based other than polyvinyl chloride (PVC)) from 205.601 (b) (2) (ii) -as herbicides, weed barriers, as applicable, based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: N/A

Motion by: Harriet Behar
Seconded by: Dave Mortensen
Yes: 0 No: 6 Abstain: 1 Absent: 1 Recuse: 0

Aqueous potassium silicate

Reference: 205.601(e) As insecticides (including acaricides or mite control). (2) Aqueous potassium silicate (CAS #-1312-76-1)—the silica, used in the manufacture of potassium silicate, must be sourced from naturally occurring sand.
Technical Report: 2003 TAP; 2014 TR
Petition(s): 2002 Potassium Silicate; 2006 Potassium Silicate Supplemental
Past NOSB Actions: 11/2007 NOSB recommendation; 10/2014 NOSB sunset recommendation

Recent Regulatory Background: Proposed rule (including justification) published 6/3/2009 (74 FR 26591). Added to National List 12/13/2010 (75 FR 77521). Sunset renewal notice published 06/19/15 (80 FR 35177).
Sunset Date: 6/22/2020

Subcommittee Review
Aqueous potassium silicate is used as an insecticide for insects and mites. Formulations of aqueous potassium silicate are either sprayed on the foliage of plants or incorporated in the soil with the goal of plant uptake across root and leaf boundaries. The silica tetrahedra are purported to be incorporated in boundary cells (in roots and leaves) inhibiting insect feeding and the onset of plant disease infection. The action of applying potassium silicate in a foliar spray serves to induce production of phytoalexins, chitinases and that in turn strengthen stroma and cell walls.

Aqueous potassium silicate is manufactured by combining high purity silica sand and potassium carbonate (both mined materials) and heating to a high temperature (2000 degrees F). The potassium carbonate and silicon dioxide fuse to form a molten potassium silicate glass with the evolution of carbon dioxide gas. This glass can either be 1) cooled and ground into a powder or 2) dissolved in water to form a potassium silicate solution. The solution may subsequently be spray dried to form hydrous powder granules of potassium silicate.
Internationally (Japan, Canada, EEC, CODEX, or IFOAM), natural sources of silica, not APS, are allowed (258-296).

Based on information in the January 6, 2014 technical report (TR), the following concerns were raised by the Crops Subcommittee during the 2014 Sunset review:

- Dermal exposure can lead to low to medium systemic toxicity and skin irritation (TR pp. 577-579);
- 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 (TR pp. 477-481);
- 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 (TR pp. 479-481);
- Silica supplementation can result in elongation and thickening of stems, delayed antithesis and flower deformation in some species (TR pp. 487-490);

In 2007, the Crops Subcommittee recommended not to list aqueous potassium silicate (APS) because "multiple substitutes are available" and it is a "synthetic soil applied fertilizer not compatible with organic farming regulations." The rationale given for NOSB approval was, "Public comment at Nov. 2007 NOSB meeting well supported listing the substance as plant disease control by providing historical 2003 NOSB consideration of the material as well as more information from petitioner and other interested stakeholders." New information was provided in a January 6, 2014 TR. In 2014, the Crops Subcommittee voted 4 to 3 in favor of removing aqueous potassium silicate from the National List. At the Fall 2014 NOSB meeting in Kentucky, the motion to remove Aqueous Potassium Silicate from the National List was not supported by the Board by a vote of 7 to remove and 9 against removal. Those voting for removal pointed to the bulleted items above while those voting not to remove saw the compound as an important pest control option for organic growers.

Questions remain about the compound's mechanism of action, effects on farmworkers making the foliar application, and effects on human or animal consumers. It remains unclear if aqueous potassium silicate directly enhances plant protection or if its effects are indirect through regulation of phytoalexins and chitinases that, in turn, strengthen stroma and cell walls.

Questions

1) What is the efficacy of aqueous potassium silicate relative to available alternatives?

2) How would the removal of this product impact organic growers?

3) To what extent does listing aqueous potassium silicate result in reductions in use of copper and sulfur-based pest management?

4) If potassium silicate is taken up in the roots and moved throughout the plant via apoplast or symplast movement and then incorporated in sink tissue (the leaves), then the compound is behaving like a systemic, synthetic pesticide. Is this compound systemic?

5) What evidence exists documenting the safety of animal and human ingestion of plants and forages with elevated silicate levels in leaf tissue?

6) How does age or gender of animals and humans ingesting plant material with elevated silicate levels influence their range in vulnerability?

Subcommittee vote
Aqueous potassium silicate may cause deleterious human and animal health effects such as dermal toxicity and systemic effects as well as affecting digestibility of forages. Uncertainties about the mode of action make it unclear as to whether or not this material is moved systemically in the plant. Additionally, alternatives to this material exist, and this material is not necessary for organic production.

Motion to remove aqueous potassium silicate from 205.601(e) – As an insecticide (including acaricides or mite control) - The silica, used in the manufacture of potassium silicate, must be sourced from naturally occurring sand, based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: Alternatives/Compatibility

Motion by: Dave Mortensen
Seconded by: Asa Bradman
Yes: 7 No: 0 Abstain: 0 Absent: 1 Recuse: 0

Aqueous potassium silicate

Reference: 205.601(i) As plant disease control. (1) Aqueous potassium silicate (CAS #-1312-76-1)—the silica, used in the manufacture of potassium silicate, must be sourced from naturally occurring sand.
Technical Report: 2003 TAP; 2014 TR
Petition(s): 2002 Potassium Silicate; 2006 Potassium Silicate Supplemental

Past NOSB Actions: 11/2007 NOSB recommendation; 10/2014 NOSB sunset recommendation
Recent Regulatory Background: Proposed rule (including justification) published 6/3/2009 (74 FR 26591). Added to National List 12/13/2010 (75 FR 77521). Sunset renewal notice published 06/19/15 (80 FR 35177).
Sunset Date: 6/22/2020

Subcommittee review
Aqueous potassium silicate is used as a crop protectant for disease control and suppression. Formulations of aqueous potassium silicate are either sprayed on the foliage of plants or incorporated in the soil with the goal of plant uptake across root and leaf boundaries. The silica tetrahedra are purported to be incorporated in boundary cells (in roots and leaves) inhibiting insect feeding and the onset of plant disease infection. The action of applying potassium silicate in a foliar spray serves to induce production of phytoalexins, chitinases and that in turn strengthen stroma and cell walls.

Aqueous potassium silicate is manufactured by combining high purity silica sand and potassium carbonate (both mined materials) and heating to a high temperature (2000 degrees F). The potassium carbonate and silicon dioxide fuse to form a molten potassium silicate glass with the evolution of carbon dioxide gas. This glass can either be 1) cooled and ground into a powder or 2) dissolved in water to form a potassium silicate solution. The solution may subsequently be spray dried to form hydrous powder granules of potassium silicate.

Internationally (Japan, Canada, EEC, CODEX, or IFOAM), natural sources of silica, not APS, are allowed (258-296).

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- Silica supplementation can result in elongation and thickening of stems, delayed antithesis and flower deformation in some species (TR pp. 487-490);

In 2007, the Crops Subcommittee recommended not to list Aqueous Potassium Silicate (APS) because "multiple substitutes are available" and it is a "synthetic soil applied fertilizer not compatible with organic farming regulations." The rationale given for NOSB approval was, "Public comment at Nov. 2007 NOSB meeting well supported listing the substance as plant disease control by providing historical 2003 NOSB consideration of the material as well as more information from petitioner and other interested stakeholders." New information was provided in a January 6, 2014 TR. In 2014, the Crops Subcommittee voted 4 to 3 in favor of removing aqueous potassium silicate from the National List. At the Fall 2014 NOSB meeting in Kentucky, the motion to remove Aqueous Potassium Silicate from the National List was not supported by the Board by a vote of 7 to remove and 9 against removal. Those voting for removal pointed to the bulleted items above while those voting not to remove saw the compound as an important pest control option for organic growers.

Questions remain about the compound's mechanism of action, effects on farmworkers making the foliar application, and effects on human or animal consumers. It remains unclear if aqueous potassium silicate directly enhances plant protection or if its effects are indirect through regulation of phytoalexins and chitinases that, in turn, strengthen stroma and cell walls.

Questions

1) What is the efficacy of aqueous potassium silicate relative to available alternatives?

2) How would the removal of this product impact organic growers?

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4) If potassium silicate is taken up in the roots and moved throughout the plant via apoplast or symplast movement and then incorporated in sink tissue (the leaves), then the compound is behaving like a systemic, synthetic pesticide. Is this compound systemic?

5) What evidence exists documenting the safety of animal and human ingestion of plants and forages with elevated silicate levels in leaf tissue?

How does age or gender of animals and humans ingesting plant material with elevated silicate levels influence their range in vulnerability?

Subcommittee vote

Aqueous potassium silicate may cause deleterious human and animal health effects such as dermal toxicity and systemic effects as well as affecting digestibility of forages. Uncertainties about the mode of action make it unclear as to whether or not this material is moved systemically in the plant. Additionally, alternatives to this material exist, and this material is not necessary for organic production.

Motion to remove aqueous potassium silicate from §205.601(i) - As plant disease control - The silica, used in the manufacture of potassium silicate, must be sourced from naturally occurring sand, based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: Alternatives/Compatibility
Motion by: Dave Mortenson
Seconded by: Harriet Behar
Yes: 7 No: 0 Abstain: 0 Absent: 1 Recuse: 0

Elemental sulfur

Reference: 205.601(e) As insecticides (including acaricides or mite control). (5) Elemental sulfur.
Reference: 205.601(i) As plant disease control. (10) Elemental sulfur.
Reference: 205.601(j) As plant or soil amendments. (2) Elemental sulfur.

Technical Report: 1995 TAP; 2018 TR
Petition(s): N/A
Past NOSB Actions: Actions: 04/1995 NOSB minutes and vote; 11/2005 NOSB sunset recommendation; 04/2010 sunset recommendation; 10/2010 NOSB sunset recommendation; 10/2015 NOSB sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Sunset renewal notice published 03/21/17 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review
Elemental sulfur can come either from a natural mined source, or be produced as a by-product from natural gas or petroleum operations and refinery processes. The latter appears to be the primary source of most elemental sulfur currently being used. Elemental sulfur has been used for centuries and approved for use in the U.S since 1920.

The European Economic Community (EEC) Council Regulation (EEC No 2092/91) carried over by Article 16(3)(c) of Regulation No 834/2007, permits the use of sulfur as a fungicide, acaricide, and repellent in organic food production. The International Federation of Organic Agriculture Movement's (IFOAM) lists sulfur as an approved substance for use as pest and disease control, fertilizer/soil conditioner, and crop protectant and growth regulator. Codex Alimentarius Commission (CAC GL 32-1999) permits the use of sulfur for pest and disease control when the certification body or authority recognizes the need for plant protection (Codex, 2013). Sulfur is also allowed by Canadian Organic Standards. The Canadian General Standards Board (CGSB) includes non-synthetic elemental sulfur as a permitted substance for organic production systems (CAN/CGSB-32.311-2015) for use as a soil amendment and as a foliar application. Chemically synthesized substances cannot be added, and chemical treatment is prohibited. The CGSB also permits the use of sulfur for the control of external parasites and sulfur smoke bombs in conjunction with other methods used for rodent control when a pest control program is temporarily overwhelmed. The Japan Agricultural Standard (JAS) for Organic Production (Notification No. 1605 of 2005) permits the use of sulfur as a fertilizer or soil improvement substance and as a substance for plant pest and disease control.

Sulfur is heavily used in agriculture worldwide for two distinct purposes with different application methods: as a plant nutrient and as a pesticide. It is the most heavily used pesticide in California, with over 50,000,000 pounds used annually, representing more than 25% of all agricultural pesticide use in the state. Accurate information on pesticidal use in the organic sector is not available.

An updated Technical Report was completed on April 19, 2018. No new information contradicts historical information that characterizes sulfur as an important and relatively safe material for organic agriculture. However there are some recent studies that suggest potential associations of between agricultural sulfur use and community respiratory health. Sulfur is an essential plant nutrient, naturally present in our food and soil, and is part of normal human biochemistry. Elemental sulfur is relatively innocuous in the environment when used according to the product label. It is also low in toxicity. It should not be used within one month of any horticultural oil product, as currently stated on most sulfur labels. Two previous Sunset Material Reviews (2005 & 2010) of elemental sulfur have resulted in continuing approval of all three uses. Although low in acute toxicity, sulfur is a respiratory, ocular, and dermal irritant and has significant impacts on farmworker health. Farmworker exposures can be mitigated if label recommendations and proper PPE recommendations are followed. A recent study also reported significant associations between agricultural use of sulfur and poorer respiratory health in children living near fields (https://ehp.niehs.nih.gov/ehp528/). Several agricultural commissioners in California have encouraged a shift to wettable formulations in vineyard applications and anecdotal information suggests fewer drift and regulatory problems.

Historically there has been strong support for the continued listing of sulfur, particularly for use against various bacterial and fungal diseases and other pests and as a plant and soil amendment. In October 2017, the NOSB recommended approval of sulfur use as a molluscicide. Public comment during the October 2017 meeting was strongly in support of continued listing of sulfur. Grape, strawberry, and other growers consider sulfur to be essential and described investments in equipment to apply sulfur, including dust application technologies to reduce drift. Several commenters, including environmental advocates and growers, did not support relisting of sulfur due to human health and potential environmental impacts or supported restrictions on use of dust applications.

Based on the extensive public comment and discussions, new technical reviews, previous committee votes & discussions, and historical public comment, it would appear that elemental sulfur is still necessary in organic crop production. The NOSB should continue to monitor sulfur use in organic agriculture and respond to any new information raising environmental or, in particular, public health concerns.

Subcommittee vote

Motion to remove elemental sulfur from the National List at §205.601 (e)(5), §205.601 (i)(10), and §205.601 (j)(2) based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: NA
Motion by: Asa Bradman
Seconded by: Harriet Behar
Yes: 0 No: 7 Abstain: 0 Recuse: 0 Absent: 1

Lime sulfur

Reference: 205.601(e) As insecticides (including acaricides or mite control). (6) Lime sulfur—including calcium polysulfide.
Reference: 205.601(i) As plant disease control. (6) Lime sulfur.
Technical Report: 1995 TAP (Livestock - hydrated lime); 2014 TR
Petition(s): N/A
Past NOSB Actions: Actions: 04/1995 NOSB minutes and vote; 11/2005 NOSB sunset recommendation; 10/2010 NOSB sunset recommendation; 10/2015 NOSB sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Sunset renewal notice published 03/21/17 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review

Lime sulfur is on the National List at §205.601(e)(6) as an insecticide (including acaricide or mite control) and at §205.601 (j)(6) for plant disease control. As an insecticide, lime sulfur is used to control mites (spider mites and rust mites), aphid, and san jose scale in tree fruit and other organic crops. As a fungicide, it is used to control powdery mildew, anthracnose, scab, peach leaf curl, and several other plant diseases in tree fruit and berry crops. It is also part of a process that when used in conjunction (or in rotation) with other allowed materials, as a replacement for the two recently removed antibiotics, for assisting to control fire blight in organic apple and pear production.

Lime sulfur is often referred to by its chemical name, calcium polysulfide. It is considered to be synthetic and is produced by reacting boiling calcium hydroxide [$CaOH_2$] and ground sulfur (2014 TR). Residues of lime sulfur are exempt from the requirement of a tolerance under 40 CFR 180.1232 as determined by the U.S. EPA because the calcium polysulfides found in lime sulfur products rapidly degrade to calcium hydroxide and sulfur in the environment and human body.
Lime sulfur is allowed among other international certification bodies:

- Canada – allowed as a fungicide, insecticide, or acaricide/mite control. (CAN,21)
- Codex Alimentarius – although not mentioned specifically, organic production guidelines from Codex Alimentarius Commission (CAC GL 32-1999) permit the use of sulfur for pest and disease control when the certification body or authority recognizes the need for plant protection (Codex, 2013).
- European Union – permits the use of lime sulfur (calcium polysulfide).
- Japanese Ministry of Agriculture Forestry and Fisheries – permits the use of lime sulfur powder for plant pest and disease control.
- IFOAM – lists lime sulfur in Section II of Appendix 3: Crop Protectants and Growth Regulators (IFOAM, 2014).
- UK Soil Association – only allows the use of lime sulfur on a case-by-case basis, when there is a demonstrated major threat to a grower's crop. (Soil Association, 2014).

Lime sulfur has a long history of use for crop production. The original technical advisory panel report (TAP) used the 1922 USDA Farm Bulletin as part of its fact finding. The 2014 technical evaluation report (TR) provided an extensive list of alternative materials and practices, however, a benefit of lime sulfur is that it can act as both an insecticide and a fungicide. Alternative biological materials often need to be used preventatively whereas lime sulfur can sometimes be used to mitigate an existing crop issue. Lime sulfur can cause phytotoxicity in some crops, however, rates and timings can be used to avoid this problem. Similarly, the technical report notes that lime sulfur may impair some beneficial insects, but, once again, timing of use can minimize the negative effects. Lime sulfur is one leg of an integrated fire blight control program for pome fruits and has become especially important since antibiotics for fire blight control were removed from the National List.
The technical report noted potential human health concerns from lime sulfur primarily due to its high alkalinity or the release of hydrogen sulfide. This concern is largely mitigated during formulation or actual use if proper safety procedures are followed during manufacture and label directions are followed at application.

The vast majority of public comments during the Spring 2018 review were in favor of relisting lime sulfur for control of fungal and bacterial diseases as well as its uses for various insects. It has widespread and historical use across many crops and regions. Many comments note that there are not viable alternatives for its various uses, especially as part of an integrated fire blight control program. The few comments against lime sulfur primarily referenced the Technical Report in noting that later season use of the material may have a negative impact on beneficial insects and that large scale releases of the material could cause environmental impact.

Subcommittee vote
Motion to remove lime sulfur based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: N/A
Motion by: Steve Ela
Seconded by: Emily Oakley
Yes: 0 No: 5 Abstain: 0 Absent: 2 Recuse: 0

Sucrose octanoate esters

Reference: 205.601(e) As insecticides (including acaricides or mite control). (10) Sucrose octanoate esters (CAS #s—42922-74-7; 58064-47-4)—in accordance with approved labeling.

Technical Report: 2005 TR

Petition(s): 2004 Sucrose Octanoate Esters; Amendment #1; Amendment #2

Past NOSB Actions: 08/2005 NOSB recommendation for addition to NL; 10/2010 NOSB sunset recommendation; 10/2015 NOSB sunset recommendation

Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Sunset renewal notice published 03/21/17 (82 FR 14420)

Sunset Date: 3/15/2022

Subcommittee Review
Sucrose octanoate esters (SOEs) belong to the organic chemical family sucrose fatty acid esters (SFAEs). SFAEs are surfactants (or surface-active agents) that lower the surface tension of a liquid, allowing easier spreading and evaporation. SOEs are manufactured from sucrose (table sugar) and an octanoic acid ester commonly found in plants and animals. Sucrose esters, as a class of related compounds, vary, depending on the number and locations of esters attached to the sucrose molecules. Sucrose has eight potential places where individual esters may attach (Montello Inc., n. d.). The substance under review is a mixture of mono-, di-and tri-esters (TR lines 24-31).

Sucrose esters were first isolated when researchers investigated the insecticidal properties of the tobacco leaf hairs. This insecticidal property of sucrose esters acts by dissolving the waxy protective coating (cuticle) of target pests, thus causing them to dry out and die (U.S. EPA, 2002b). SOEs marketed as biopesticides are intended to mimic the pest control properties of *Nicotiana gossei* Domin (wild tobacco) and other *Nicotiana* species. In addition to the tobacco plant, insecticidal sugar esters have been found in wild tomato and wild potato species and in the petunia plant (Chortyk et al., 1996) (TR lines 33- 38).

SOEs are approved for use as a contact-type biochemical insecticide/miticide (EPA Registration Number 70950-2, OPP No. 035300) to control soft-bodied insects (TR lines 69 - 70). SOEs are permitted by EPA for use as a biopesticide for foliar spray in field, greenhouse, and nursery use on any type of agricultural commodity (including certain non-food ornamentals), as well as on mushroom growing media and on adult honey bees (U.S. EPA, 2002a).

According to the 2005 technical report, when SOEs are applied according to EPA approved labelled instructions, no direct exposure of birds or aquatic organisms is expected (U.S. EPA, 2002a). SOEs biodegrade within approximately five days at 68-80.6°F/20-27°C, in both aerobic and anaerobic conditions, so there is minimal potential for exposure for insects, fish, and other non-target wildlife. (U.S. EPA, 2002a).

Many commenters during the Spring 2018 NOSB public comment period stated that they did not use SOEs on their operations; nevertheless, there were four positive public comments that stated that it was an effective tool used in rotation with other pest control materials that are allowed for use in organic production. There were no negative comments about the continued listing of SOEs on 205.601(e).

Additional information requested by Subcommittee

1. Is additional information available about the toxicity of SOEs to non-target organisms when exposed by spray (including predators, parasitoids, soil fauna, and aquatic organisms)?
2. Is this product still being used, or are there other approved synthetic or natural products that are more effective?
3. If SOEs are not being used, do we need it to keep in the crops toolbox to be rotated with other products?

Subcommittee vote

Motion to remove sucrose octanoate esters (SOEs) based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: N/A
Motion by: Sue Baird
Seconded by: Jesse Buie
Yes: 0 No: 7 Abstain: 0 Absent: 1 Recuse: 0

Hydrated lime

Reference: 205.601(i) As plant disease control. (4) Hydrated lime.
Technical Report: 1995 TAP; 2001 TAP; 2002 TR for Calcium Hydroxide
Petition(s): N/A
Past NOSB Actions: 04/1995 NOSB minutes and vote; 04/2006 sunset recommendation; 10/2010 NOSB sunset recommendation; 10/2015 NOSB sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Sunset renewal notice published 03/21/17 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee review

Hydrated Lime is used as a foliar application in combination with copper sulfate ($CuSO4$). This mixture is also referred to as the 'Bordeaux mix.' The role of the hydrated lime ($Ca(OH)2$) is that of a precipitating agent making the copper available to prevent infestations of mildews and other pathogenic fungi in a range of fruit production systems.

Manufacture
Hydrated Lime is considered a synthetic substance. The production of hydrated/slaked lime involves two elementary reactions beginning with naturally occurring limestone deposits. In the first step, ground limestone - which contains predominantly calcium carbonate ($CaCO_3$) with smaller amounts of magnesium, silicon, aluminum and iron oxide compounds - is thermally transformed into quicklime. Specifically, heating raw or minimally processed limestone to temperatures in excess of 900 ºC results in conversion of the calcium carbonate content of limestone to calcium oxide (CaO) in a material known as quicklime. This thermal transformation occurs with liberation of carbon dioxide (CO_2) gas. In the slaking process, quicklime reacts exothermically (releases heat) with two equivalents of water to produce hydrated/slaked lime consisting primarily of calcium hydroxide ($Ca(OH)_2$). After hydration, the slightly moist slaked lime is conveyed to a separator where coarse fractions are removed, and the powder is dried.

International acceptance by other international certifying bodies
The Canadian General Standards Board, the European Union and the International Federation of Organic Agriculture Movements allow hydrated lime for use as a foliar application to plants for disease suppression.

Environmental/Health Issues
Careful procedures are needed for handling hydrated lime as it can severely irritate and burn the eyes, skin, and mucous membranes. The hydroxide anions (OH^-) generated from dissolution of calcium hydroxide in water or other fluids is the main driver of toxicity for the substance. The effects of the substance on biological and chemical interactions in the agroecosystem are limited given its use as a plant disease suppressant. It is important to note that much has been learned about the impact of hydrated lime as a soil liming agent to elevate soil pH. However, orders of magnitude smaller amounts of the substance are used in the requested application as the mixture is applied to the foliage of the plants to limit plant disease establishment and spread.
The primary environmental issues associated with production of hydrated lime include energy use and dust formation. Calcium oxide is obtained through thermal decomposition of calcium carbonate (limestone) in fuel-powered kilns, a process that requires large amounts of energy. Crushing and handling of limestone and the burning, processing and handling of quicklime and hydrated lime results in dust emissions. Significant advances in deploying filtration systems have mitigated these effects.

Discussion
Two Technical Advisory Panels *(TAPs)* and a Technical Report (TR) were compiled in 1995, 2001 and 2015, respectively. The use of hydrated lime as has been practiced in organic production is known to be an effective disease suppression practice. The use of hydrated lime in Bordeaux mix to make copper available for disease suppression is highly effective and widely used by fruit and vegetable growers. The Crops Subcommittee received many supporting letters for continued use of hydrated lime as an integral part of disease pest management. The past sunset review conducted in Fall 2015 resulted in a unanimous vote not to remove hydrated lime from the National List.

Questions:
Are adequate safety procedures in place to prohibit fieldworker and applicator exposure to hydrated lime?

Subcommittee vote
Motion to remove hydrated lime based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: N/A
Motion by: Dave Mortenson
Seconded by: Jesse Buie
Yes: 0 No: 7 Abstain: 0 Absent: 1 Recuse: 0

Liquid Fish Product

Reference: 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.
Technical Report: 1995 TAP; 2006 TR
Petition(s): N/A
Past NOSB Actions: 04/1995 NOSB minutes and vote; 11/2005 NOSB sunset recommendation; 10/2010 NOSB sunset recommendation; 10/2015 NOSB sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Sunset renewal notice published 03/21/17 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review
Liquid fish products are used as fertilizers for the production of organic crops. These products contain fundamental nutrients and many trace minerals critical for use in organic farming. Liquid fish fertilizers are used in soil and container productions systems. Liquid fish foliar applications improve crop yields and reduce both insects and diseases.

Liquid Fish Products are made from fish byproducts that are chopped and then enzymatically digested and heated or enzymatically processed without heat (cold-processing) to produce fish hydrolysate. Liquid fish products are then stabilized with an acid such as phosphoric, sulfuric or citric acid to prevent microbial growth. Use of formic acid is prohibited due to phytotoxicity. A third method utilizes fermentation by bacteria that produce lactic acid, which preserves the fish. All methods cannot result in pH below 3.5.

The Canadian Organic Standard allows for the use of liquid fish products. Acids are permitted to lower the pH to 3.5, but no prohibited preservatives can be used. CODEX Alimentarius allows processed animal products from slaughterhouses and fish industries contingent on recognition from a certification body or authority. The Japanese Organic Standard permits the use of food industry byproducts of fish origin if they are derived from natural sources. The International Federation of Organic Agriculture Movements (IFOAM) permits the use of fish and shell products and food processing of animal origin. Liquid fish is not on the EU Annex I list of approved fertilizers, but the EU does allow fish meals.

Nutrient runoff from excessively or improperly applied fertilizers can cause eutrophication of surface waters, potentially harming fish and other aquatic animals.

Historically, there has been strong support for keeping liquid fish products on the National List and public comment at the October, 2017 NOSB meeting reiterated the strength of that support. Many farmers considered liquid fish products to be essential for many crops, including foliar and other applications. Concerns about the sustainability of source fish, including possible use of wild fish harvested for the sole purpose of producing liquid fertilizers, were raised by the Crops Subcommittee, and extensive discussion during the October, 2017 NOSB meeting focused on production methods and sources of raw fish material for production of fish-based fertilizers. These discussions resulted in a work-agenda request to assess the environmental impact of harvesting wild, native fish for all fertilizer purposes, to protect natural fish populations, and to ensure that liquid fish and other fish-based fertilizer products used in organic production are not harmful to the environment. Information from this review could inform future policy recommendations regarding use of wild fish for organic fertilizers but is beyond the scope of review for this sunset review.

This proposal to remove will be considered by the NOSB at its public meeting. The Crops Subcommittee supports relisting of liquid fish production the National List based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: N/A

Subcommittee vote

Motion to remove liquid fish products from §205.601(j) as a plant and soil amendment based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: N/AMotion by: Asa Bradman

Seconded by: Jesse Buie

Yes: 0 No: 6 Abstain: 1 Absent: 1 Recuse: 0

Sulfurous acid

Reference: 205.601(j) As plant or soil amendments. (9) Sulfurous acid (CAS # 7782-99-2) for on-farm generation of substance utilizing 99% purity elemental sulfur per paragraph (j)(2) of this section.

Technical Report: 2010 TAP; 2014 TR

Original Petition: 2008 Sulfurous Acid

Past NOSB Actions: 05/2009 NOSB Recommendation; 10/2014 NOSB sunset recommendation

Regulatory Background: Added to National List 7/6/2010 (75 FR 38693); Sunset renewal notice published 06/19/15 (80 FR 35177).

Sunset Date: 6/22/2020

Subcommittee Review

Sulfurous acid is used to quickly acidify irrigation water in areas of the country where soils are alkaline or saline. Application of the acidic irrigation water can help to alleviate nutrient deficiencies created when saline or alkaline conditions tie up essential micronutrients. This in turn can improve crop yields and help to reduce soil degradation from salinity buildup. While similar reactions can eventually be obtained by applying soil sulfur, the reaction time of sulfur in the soil is relatively slow and the effect may take months or years to be realized (2014 TR). The last technical report was completed in 2014 and comments below draw from that report.

Sulfurous acid is created by spraying water through smoke and fumes created by burning elemental sulfur. Several substances are created in this process, including sulfur dioxide, hydrogen sulfide and hydrogen sulfite (bisulfite). The sulfur dioxide dissolved in water is often termed sulfurous acid. However, the sulfurous acid is unstable and almost immediately forms hydrogen sulfite. The hydrogen sulfite is acidic and lowers the pH of the water (2014 technical report). This process is often done on-farm with a device called a sulfur burner and the effluent from the sulfur burner is used to acidify irrigation water.

Sulfurous acid does not require a tolerance or an exemption from tolerance and appears on the EPA non-food inert list. While sulfur dioxide, a potential pollutant, is generated by the burner, that sulfur dioxide is captured in the irrigation water and the release of sulfur dioxide to the atmosphere is minimal. EPA does not regulate this emission. In fact, the sulfur used to burn in these sulfurous acid generators is often sourced from scrubbers cleaning the emissions from oil, gas and coal industries.

Sulfurous acid is a weak acid and does not produce notably toxic effects on fish, aquatic invertebrates or plants, and many bacteria possess sulfite reductase enabling them to metabolize sulfurous acid. In cases where sulfurous acid is used to acidify irrigation water, soils are often low in sulfur and the application of the sulfurous acid can be beneficial.

Most public comments from Spring 2018 were in favor of relisting sulfurous acid. Comments in support noted that this is a very effective treatment for increasing nutrient availability in alkaline soils and that alternatives would be considered an extremely poor substitute. The few commenters supportive of removing this substance listed concerns that this material allows farming on degraded and unsuitable soils and that there could be an effect on soil microorganisms from high concentrations of this material. These comments were refuted by other public commenters, and those other commenters also noted that this is only a very slightly acidifying material and is used in place of applications of large amounts of soil sulfur over many years.

Subcommittee vote

Motion to remove sulfurous acid based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: N/A
Motion by: Steve Ela
Seconded by: Harriet Behar
Yes: 0 No: 5 Abstain: 0 Absent: 2 Recuse: 0

Ethylene gas

Reference: 205.601(k) As plant growth regulators. Ethylene gas—for regulation of pineapple flowering.
Technical Report: 2000 Supplemental TAP; 2007 TAP; 2011 Supplemental TR

Petition(s): N/A
Past NOSB Actions: 10/1995 NOSB recommendation; 10/2001 recommendation; 11/2005 NOSB sunset recommendation; 04/2011 NOSB sunset recommendation; 10/2015 NOSB sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Sunset renewal notice published 03/21/17 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review
Ethylene gas is listed as a growth regulator for organic pineapple production only. It is used to induce uniform flowering in pineapples and is applied 7-15 months after planting. Application can be repeated two to three times after the initial application (TR lines 53-56). It is made from hydrocarbon feedstocks, such as natural gas liquids or crude oil. It is produced almost exclusively from the pyrolysis of hydrocarbons in tubular reactor coils installed in externally fired heaters. Ethylene may also be produced from ethanol in fixed or fluid-bed reaction systems (2007 TAP). The main safety concern in relation to ethylene use has been the explosive nature of the gas in the air. Operators should be well trained and prepared, though the safety concern to workers is limited when correctly used and monitored (2007 TAP).

The most recent Technical Report (TR) for this material was a supplement developed in 2011 which addressed questions of continued need, use according to scale of operation, and new alternatives. The TR found that small-scale operations likely cannot afford the expensive equipment needed for whole plant application of ethylene gas in large fields (TR lines 215-16). Various technologies for applying ethylene were reported, including some limited evidence that smaller-scale producers are successfully adapting ethylene using handheld booms and manual application techniques in East and West Africa. Experiments involving cold treatment were reported in Taiwan, though actual use patterns in the field are unknown (TR lines 191-210). Alternative natural methods to induce flowering have not changed since the initial material review in 1999. These methods include cold stress, smoke, exposure to ripe fruits, and selective tilling of the weeds and cutting back of trees in agroforestry systems (TR lines 73-75).

This material was reviewed in 2015 as part of the 2017 sunset process. The NOSB was concerned about the lack of comments from pineapple producers for the spring meeting, and they included another request to hear from stakeholders in the proposal for the fall meeting. Subsequently, organic pineapple producers, primarily from Costa Rica, presented a large number of both written and oral comments. These comments, along with historic information, previous sunset reviews, and discussions at the fall meeting helped to provide the NOSB with information about this material, how it is used by operations of various sizes, and the significance it plays in crop production. There have been concerns in the past that this material is used only by larger operations. However the Fall 2015 grower comments showed that organic pineapple producers of all sizes use this material. Public testimony stated that the current level of organic pineapple production is dependent on the availability of this material. No new issues of human health or environmental concerns were raised that had not been addressed in previous review cycles.

As part of the Spring 2018 public meeting, the Crops Subcommittee requested additional information regarding the issue of scale and the use of ethylene and alternative technologies. Written and oral testimonies expressed continued support for this material, stating that it is an essential tool for the commercial production of pineapples for the export market. Commenters stated that no viable alternatives exist. Without ethylene, commenters said, it would be impossible to achieve the uniform ripening necessary for timing the harvest for fruit shipment. Others commented that the material does not fit any OPFA criteria, and it is not essential for the production of the crop but rather is employed for economic reasons.

Subcommittee vote
Motion to remove ethylene gas from §205.601 (k) based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: N/A
Motion by: Emily Oakley
Seconded by: Harriet Behar
Yes: 0 No: 7 Abstain: 0 Absent: 1 Recuse: 0

Microcrystalline cheesewax

Reference: 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.
Technical Report: 2018 TR
Petition(s): 2007 Petition; 2008 Petitioner response to questions
Past NOSB Actions: 05/2008 NOSB recommendation; 10/2015 NOSB sunset recommendation
Recent Regulatory Background: Federal Register rule amendment published 02/14/12 (77 FR 8089); Sunset renewal notice published 03/21/17 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review

Microcrystalline waxes are a type of wax derived from the refining of heavy petroleum distillates during the petroleum refining process. It is recovered from crude oil through a series of filtration, solidifying, and solvent extraction steps. The by-product must then be de-oiled at a wax refinery, resulting in three components of the cheesewax. Depending on the end use and desired specification, the product may then have its odor removed and color removed (which typically starts as a brown or dark yellow). This is usually done by means of a filtration method or by hydro-treating the wax material. All the solvents in the process are recovered, with none remaining in the final product.

Microcrystalline cheesewax has been approved by the United States Food and Drug Administration (FDA) at 21 CFR § 172.888 as a "synthetic petroleum wax," for use as a "masticatory substance," in chewing gum, a "protective coating," on cheese and raw fruits and vegetables, and as a "defoamer in food." Microcrystalline cheesewax as a petroleum wax is also listed by the FDA at 21 CFR 178.3710 as an allowed "component of nonfood articles in contact with food."

Microcrystalline cheesewax is not listed in the Organic Foods Production Act of 1990, but is currently listed under the National Organic Program (NOP) regulations at 7 CFR 205.601(o) as a synthetic substance allowed as a "production aid," for "use in log grown mushroom production," with the exception that the wax "must be made without either ethylene-propylene co-polymer or synthetic colors."

Microcrystalline wax is used in mushroom production to seal plug holes in Shiitake logs in which mushroom spawn is inserted. It is melted to a liquid state to be placed in the spawn hole as a sealant to hold in the moisture and to physically hold the mushroom spawn in place when placed over the hole in the log in which the spawn has been inserted. The original petition stated that there is no contact with the growing mushrooms at any time during the mushroom growing process.

Microcrystalline cheesewax is melted to a liquid state to be placed in the spawn hole. During the melting process, petrochemical fumes might be released, causing mild respiratory irritation, according to the Materials Safety Data Sheet. The cheesewax meets the FDA requirements for use in non-food articles in contact with food and for use in food (21 CFR 178.3710 and 21 CFR 172.886). Formulations of the microcrystalline cheesewax contains BHT as an antioxidant preservative.

Microcrystalline cheesewax breaks down readily in the environment, is not toxic to soil flora and fauna, and does not dissolve readily in water.

Neither microcrystalline cheesewax, nor its components are listed in any of the international organic standards as a production aid in mushroom production. The Canadian General Standards Board Permitted Substances List, CAN/CGSB-32.311 "Table 6.5 Processing aids" prohibits the use of microcrystalline wax "either alone or in formulations with paraffin wax."

During the Spring 2018 public comment period, NOSB heard from several commenters who stated that commercial operations were no longer producing Shiitake mushrooms on logs, reducing the need for the microcrystalline cheesewax as inoculation plugs. Others commented that there is a natural soy-based wax available for use now, and that the substance is no longer needed. Nevertheless, most commenters felt that there were smaller Shiitake mushroom growers that are still growing the Shiitake mushrooms on whole logs and are still using the microcrystalline cheesewax as inoculation plugs and supported the continued listing of microcrystalline cheesewax on 205.601(o).

Additional information requested by Subcommittee

1. During the 2008 NOSB recommendation review it was determined that there were no effective approved natural or synthetic materials that could replace microcrystalline cheesewax for plugging Shiitake mushroom log-grown substrates. Is there now an effective natural or approved synthetic replacement for the microcrystalline cheesewax that is derived from petroleum by-products?

2. Should an annotation be added that requires removal of residues of the microcrystalline cheesewax that remain in the environment once the Shitake logs are finished fruiting?

3. Canada and Japan, and perhaps other countries, also produce organic Shitake mushrooms, but do not allow the use of microcrystalline cheesewax in their organic production. Why do these countries not allow the microcrystalline cheesewax and/or what other types of substances are those producers using as a sealant?

Subcommittee vote
Motion to remove microcrystalline cheesewax based on the following criteria in the Organic Foods

Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: Alternatives, such as a natural soy-based wax are available to replace this synthetic material. Additionally, many operations are no longer producing Shitake mushrooms on logs, thus this material may no longer be needed.
Motion by: Sue Baird
Seconded by: Emily Oakley
Yes: 2 No: 4 Abstain: 1 Absent: 1 Recuse: 0

Potassium chloride

Reference: 205.602(e) Potassium chloride—unless derived from a mined source and applied in a manner that minimizes chloride accumulation in the soil.
Technical Report: 1995 TAP
Petition(s): N/A
Past NOSB Actions: 04/1995 NOSB minutes and vote; 11/2005 NOSB sunset recommendation; 10/2010 NOSB sunset recommendation; 10/2015 NOSB sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Sunset renewal notice published 03/21/17 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review
Potassium is required for health in humans, plants, and microorganisms (TAP pg. 4, 14). Potassium is an essential element for plants as they use it to regulate movement of water and nutrients within the plant, photosynthesis regulation, and enzyme activation. While potassium is found in many soils, it may not exist naturally in a high enough concentration for optimal plant growth, and/or it may be present but in a bound format rendering it unavailable. Potassium is commonly used by growers either alone, as a complex in potassium chloride, or as an ingredient in a fertilizer blend for soil supplementation. Chloride is also an essential element for plants (TAP pg. 12); however, monitoring of chloride use is required to assure soil salinity is managed appropriately. The current annotation in the NOP regulations stipulates chloride monitoring when potassium chloride is used to prevent chloride accumulation in soils.

During the last sunset review in 2015, the NOSB voted unanimously to relist potassium chloride at §205.602(e) with the current annotation requiring origin from a mined source, and that it is applied in a manner to prevent chloride accumulation in the soil.

For the first posting of the sunset review of potassium chloride (in Spring 2018), the NOSB asked the public two questions:

1. Is potassium chloride still required for growers?
2. Are non-chloride potassium products available to organic growers that would eliminate the concern for chloride accumulation in the soil?

Public comment was unanimous in support of continued listing with the current annotation, and there were no other non-chloride types reported by the public. One certifier recommended that the NOSB update the technical report on this substance to more thoroughly consider the use of synthetic dust suppressants or other synthetic additives.

Subcommittee vote

Motion to remove potassium chloride -unless derived from a mined source and applied in a manner that minimizes chloride accumulation in the soil from 205.602(e), based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: N/A.
Motion by: Harriet Behar
Seconded by: Emily Oakley
Yes: 0 No: 7 Abstain: 0 Absent: 1 Recuse: 0