National Organic Standards Board
Crops Subcommittee (CS)
Petitioned Material Proposal
Chitosan – Addition to National List
Fall 2026

Summary of Petition [August 2025]:

The Crops Subcommittee (CS) received two petitions in 2025 related to chitosan in crop production. The first was received in May 2025 and requests NOSB reclassify chitosan as "nonsynthetic," rendering it allowed for use in organic crop production. The second was received in August 2025 and requests NOSB add chitosan to the National List as a synthetic substance allowed for use in organic crop production. This evaluation addresses the petition to list chitosan on the National List.

Listing Petition: The CS received a petition from chitosan manufacturer, Tidal Vision, in August of 2025. The review of the petition, a Technical Report (TR) produced in 2020 for the CS, and a TR produced in 2026 for the Handling Subcommittee (HS) revealed that while the petitioner requested addition to the National List at 7 CFR 205.601(i) for plant disease control, chitosan can also be used as a plant and soil amendment, which would not require application of restrictions outlined at §205.206 prior to its use. This review covers both chitosan's use as a plant disease control material as well as a crop and soil amendment.

Subcommittee Review

The Subcommittee discussed whether chitosan meets National List criteria (7 U.S.C. 6517-6518) and should be added to the National List. In general, the Subcommittee agreed that the substance meets National List criteria and should be added to the National List. There were questions about the need for a better understanding about the mode of action for chitosan as a crop disease control. However, there was also agreement that it is a nontoxic alternative to other more toxic crop disease control substances. The subcommittee discussed listing as both a crop disease control agent as well as a crop and soil amendment. Since chitosan's mode of action supports plant resilience, rather than by taking direct action against plant diseases, it made sense to expand the use pattern allowances for this material to include crop and soil amendments.

Category 1: Classification

1. For CROP use: Is the substance _____ **Non-synthetic** or ___x____ **Synthetic?**
   Is the substance formulated or manufactured by a process that chemically changes a substance extracted from naturally occurring plant, animal, or mineral sources? [7 U.S.C. 6502(21)] If so, describe, using NOP 5033-1 as a guide.

   Chitosan is chemically extracted from a naturally occurring animal source – crustacean shells. However, at the end of the extraction process, the material has been transformed into a different substance via chemical change. The use of strong synthetic alkali materials like sodium or potassium hydroxide deproteinates shells during chitin isolation [2020 TR 595-598]. Then manufacturers use strong acids to demineralize the chitin [2020 TR, lines 604-605]. Strong alkali materials are then again used for the deacetylation process to convert chitin into chitosan.

The TR also describes that chitosan production using biological means is possible, it remains a process limited solely to the laboratory and no commercial production using this method is known [2020 TR, lines 670-674]

2. Reference to appropriate OFPA category:
   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 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 Environmental Protection Agency as inerts of toxicological concern?

   Chitosan was added, via federal rulemaking, to EPA's list of Section 25(b) pesticides which are exempt from registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Therefore, it is a synthetic active ingredient that is considered pesticidal. Additionally, however, it can be used as a soil amendment to stimulate plant resilience, and much like sulfur, should be considered for inclusion on the National List in multiple locations.

Category 2: Adverse Impacts

1. What is the potential for the substance to have detrimental chemical interactions with other materials used in organic farming systems? [§6518(m)(1)]

   The application of chitosan as an active ingredient in pesticidal products or as a plant or soil amendment is unlikely to be harmful to the environment. It occurs naturally in quantities exceeding what would be used in organic crop production and it degrades into substances that are non-toxic and readily used as nutrients. [2020 TR, lines 70-736]

2. What is 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? [§6518(m)(2)]

   Due to the variety of results found in different studies it is likely that chitosan has multiple antibacterial modes of action. One hypothesis is that positively charged chitosan binds to negatively charged cell surface molecules. Another hypothesis is that smaller chitosan molecules move through cell walls and inhibit gene transcription. There is also another thought that chitosan chelates essential nutrients making them unavailable to bacteria. Chitosan can also initiate systemic resistance in plants and may act directly between host and pathogen to block the growth of the pathogen itself. Since chitosan is used at low levels and is degraded by soil microorganisms there is expected to be no increase in the environment [2020 TR, lines 742-754].

3. Describe the probability of environmental contamination during manufacture, use, misuse or disposal of such substance? [§6518(m)(3)]

   Because of the low toxicity of chitosan, the misuse of the product or its disposal are expected to have minimal effects on the environment. Both chlorine and sodium hydroxide are used in production of chitosan and are toxic in the environment if not contained in transport [2020 TR,

lines 759-814]. These concerns related to the chemicals used for the extraction and manufacturing are most concerning when chitosan is manufactured outside of the United States and, therefore, not subject to EPA handling requirements.

4. Discuss the effect of the substance on human health. [§6517(c)(1)(A)(i); §6517(c)(2)(A)(i); §6518(m)(4)].

   According to numerous sources as reported in the Technical Report, chitosan is nearly non-toxic to humans and most other animals, and its degradation products do not cause side effects in the body (US EPA). [2020 TR, lines 912-913].

5. Discuss any effects the substance may have on biological and chemical interactions in the agroecosystem, including the physiological effects of the substance on soil organisms (including the salt index and solubility of the soil), crops and livestock [§6518(m)(5)].

   Pesticide studies about the use of chitosan as an active ingredient have shown that there might be temporary changes to soil microbial communities. Being a large polymer with numerous reactive sites, it is difficult to characterize all possible chemical interactions involving chitosan. the Technical Report found studies that chitosan can limit the ability of some microorganisms to absorb nutrients, but it can also act as a chelator. It has been suggested because of this it might be used as a material to improve the anionic exchange capacity of soils to limit the leaching of anionic nutrients and improve nutrient delivery to plants [2020 TR, lines 845-888].

6. Are there any adverse impacts on biodiversity? (7 CFR 205.200)

   At the rates this substance is applied, no adverse impacts on biodiversity are expected. [2020 TR 894-906]

Category 3: Alternatives/Compatibility

1. Are there alternatives to using the substance? Evaluate alternative practices as well as non-synthetic and synthetic available materials. [7 U.S.C. 6518(m)(6)]

   As the Technical Report emphasizes, good farming practices, including suppressive soils, creating unfavorable conditions for pathogens, managing disease vectors such as aphids, sterilizing soils with heat and planting resistant cultivars reduce the need to use disease control substances. Also, there are more than 200 products listed by OMRI for use as plant disease control. Some do contain synthetic active ingredients, but many contain nonsynthetic active ingredients such as bacteria, microorganism extracts, botanical substances, oils, and natural acids [2020 TR, lines 950-955]. Additionally, chitosan has the potential to replace or reduce toxic copper compound use, which, while currently allowed in organic production, do pose their own environmental impacts in both manufacturing and application. Chitosan is clearly less toxic than copper, and its use has the potential to reduce copper usage in organic plant disease control. Chitosan is also allowed as a crop and soil amendment to stimulate plant resiliency [2020 TR, lines 373-375. Soil amendments, by definition, do not contain high concentrations of plant nutrients, but are used to improve physical, chemical, or biological properties.

2. In balancing the responses to the criteria above, is the substance compatible with a system of sustainable agriculture? [§6518(m)(7)]

   Chitosan is a fairly benign substance with little toxic impact on the environment when used as either a pesticide or as a soil amendment. Its manufacturing process does raise some concerns related to toxic substances, especially when manufactured outside of the United States and EPA oversight. However, the potential for chitosan to reduce copper usage on organic farms, its mode of action which is to increase plant resiliency (as opposed to provide a toxic impact on plant diseases), and the fact that it is derived from a waste material, lead the CS to conclude that the substance is compatible with a system of organic agriculture and should be added to the National List at 7 CFR 205.601(i) As plant disease control, and at 7 CFR 205.601(j) As crop or soil amendments

Classification Motion:
Motion to classify Chitosan (CAS 9012-76-4) as synthetic
Motion by: Nate Lewis
Seconded by: Franklin Quarcoo
Yes: 3 No: 0 Abstain: 0 Recuse: 0 Absent: 2

National List Motions:
Motion to add chitosan (CAS 9012-76-4) to the National List at § 205.601(j) as a crop or soil amendment
Motion by: Nate Lewis
Seconded by: Franklin Quarcoo
Yes: 3 No: 0 Abstain: 0 Recuse: 0 Absent: 2

Motion to add chitosan (CAS 9012-76-4) to the National List at § 205.601(i) as a crop disease control
Motion by: Nate Lewis
Seconded by: Dilip Nandwani
Yes: 3 No: 0 Abstain: 0 Recuse: 0 Absent: 2