

**FORMAL RECOMMENDATION BY THE  
NATIONAL ORGANIC STANDARDS BOARD (NOSB)  
TO THE NATIONAL ORGANIC PROGRAM (NOP)**

**Date:** April 29, 2010

**Subject: Production Standards for Terrestrial Plants in Containers and Enclosures  
(Greenhouses)**

**Chair:** Daniel G. Giacomini

**Recommendation**

The NOSB hereby recommends to the NOP the following:

Rulemaking Action: X

Guidance Statement:

Other:

**Summary Statement of the Recommendation (including Recount of Vote):**

The NOSB voted 12 yes, 1 no, and 2 absent in favor of a Production Standard for Terrestrial Plants in Containers and Enclosures (Greenhouses). This recommendation sets forth guidelines by which normally terrestrial plants, not including mushrooms, sprouts, and micro-greens; may be certified organic under a new section of the Crops Standard 205.209.

**NOSB Vote: Motion: Tina Ellor Second: Jeffrey Moyer**

*Board vote: Yes - 12 No- 1 Abstain- 0 Absent - 2*

**Summary Rationale Supporting Recommendation (including consistency with OFPA and NOP):**

Please see Appendix A attached to this document for a brief history of this issue, starting in 1995. In Fall of 2001, the NOSB passed a Greenhouse Production System recommendation, also attached. In 2003, the Crops Committee prepared a guidance document relative to hydroponics and other soil-less growing systems (Appendix A). Another Guidance Statement relative to Soil-less growing systems was prepared by the Crops Committee in April, 2008; also attached. Two more versions of a 'soil-less recommendation' were brought forth by the Crops Committee: one in May of 2009, and another in November of 2009. Each time a new versions was brought forward, changes were made in response to public comment and input on the previous version. The final version, brought forward to the full board by the Crops Committee for the April, 2010 NOSB is a result of these years of work, discussion, and input from our stakeholders.

**Response by the NOP:**

**National Organic Standards Board (NOSB)  
Crops Committee Recommendation**

**Production Standards for Terrestrial Plants in Containers and Enclosures  
(Greenhouses)**

**January 23, 2010**

**I. Introduction:**

This recommendation for rulemaking addresses certain aspects of greenhouse production that are commonplace in indoor cropping methods, such as container based rooting media (potting mixtures), hydroponics, and aeroponics. Additionally, provisions are put forth to protect against contamination and commingling of organic crops by non-organic crops in the same greenhouse structure or adjacent ones.

**II. Background**

In May 2009 the Crops Committee presented for discussion a document clarifying the NOSB's position on soil-less growing systems, such as hydroponics, as they pertain to organic certification to the USDA National Organic Program standards. The present recommendation focuses on greenhouse production, but it is based on the same criteria and principles outlined in the soil-less systems document.

**III. Discussion**

The organic farming method derives its name from the practice of maintaining or improving the organic matter (carbon containing) content of farm soil through various methods and practices. The reason this is the central theme and foundation of organic farming is not inherent to the organic matter itself, but is based on the importance of the organic matter to the living organisms that inhabit soils, particularly for its positive influence on proliferation of diverse populations of organisms that interact in a beneficial way with plant roots. These microscopic organisms, found in abundance in well maintained soils, interact in a symbiotic manner with plant roots, producing the effect of strengthening the plant to be able to better resist or avoid insect, disease and nematode attack, as well as assisting the plant in water and mineral uptake. The abundance of such organisms in healthy, organically maintained soils form a biological network, an amazing and diverse ecology that is 'the secret', the foundation of the success of organic farming accomplished without the need for synthetic insecticides, nematicides, fumigants, etc. In practice, the organic farmer is not just a tiller of the soil, but a steward of the soil ecology on the farm, hence some of the alternate names for this realm of production, such as ecological or biodynamic farming.

Observing the framework of organic farming based on its foundation of sound management of soil biology and ecology, it becomes clear that systems of crop production that eliminate soil from the system, such as hydroponics or aeroponics, can not be considered as examples of acceptable organic farming practices. Hydroponics, the production of plants in nutrient rich solutions or moist inert material, or aeroponics, a variation in which plant roots are suspended in air and continually misted with nutrient solution, have their place in production agriculture, but certainly cannot be classified as

certified organic growing methods due to their exclusion of the soil-plant ecology intrinsic to organic farming systems and USDA/NOP regulations governing them.

#### **IV. Relevant Areas in the Rule**

The OFPA specifically required an organic plan designed to foster soil fertility (§6513b) and the NOP regulations resulting from the Act bear this out as follows:

§205.203(a)- The producer must select and implement tillage and cultivation practices that maintain or improve the physical, chemical, and biological condition of the soil.

§205.203(b)- The producer must manage crop nutrients and soil fertility through rotations, cover crops, and the application of plant and animal materials.

§205.203(c)- The producer must manage plant and animal materials to maintain or improve soil organic matter content in a manner that does not contribute to contamination...

Although the regulations do not specifically state 'soil only production', the exclusion of soil from organic production of normally terrestrial, vascular plants violates the intent of the regulations. This intent can be seen in these sections of the rule that require proper stewardship toward improving and maintaining the soil ecology within an organic farming system. It is pointed out that naturally aquatic plant species and non-vascular plant species such as mushrooms come from different (non-soil) ecological niches and would be handled separately. Sprouts (the sprouted radicle and hypocotyl of seeds) are produced without soil by design and are not subject to this recommendation.

In previous Crops Committee discussion documents, the question has been asked: "Should container culture based growing media (typically utilized in greenhouse systems) that are predominately compost and compostable plant materials be considered 'soil'. As highlighted in earlier portions of this document, a foundational principle of organic farming is the practice of maintaining and nurturing soil health so as to foster the proliferation of the proper soil biology with their accompanying ecologies. Since all typical soil dwelling organisms, such as earthworms, protozoa, fungi, bacteria, actinomycetes, etc. can thrive in a properly designed compost based growing media, producing the beneficial symbiotic ecological relationships found in soil, such growing media should be rightfully considered soil.

#### **V. Recommendation**

##### **§ 205.2 Terms Defined**

*Greenhouse*- Permanent enclosed structure that allows for an actively controlled environment used to grow organic crops, annual seedlings or planting stock used in organic production.

*Hydroponics*- The production of normally terrestrial, vascular plants in nutrient rich solutions or in an inert, porous, solid matrix bathed in nutrient rich solutions.

*Aeroponics*- A variation of hydroponics in which plant roots are suspended in air and misted with nutrient solution.

*Containers*- Any vessel and associated equipment used to house growing media and the complete root structure of terrestrial plants and to prevent the roots from contacting the soil or surface beneath the vessel, such as, but not limited to, pots, troughs, plastic bags, floor mats. etc.

*Growing media*- Material which contains sufficient organic matter capable of supporting the plant root system and a natural and diverse soil ecology.

#### § 205.209 Terrestrial Plants in Containers and Enclosures (Greenhouses)

- (a) Container and enclosure (Greenhouse) operations must meet all applicable requirements of subparts B (205.105) and C (205.200 – 205.206) except that:
- (1) The producer operating a greenhouse with crops grown in containers using a growing media that does not include soil from the production site is exempt from requirements of 205.202(b), 205.203(a).
  - (2) In addition, the growing container based producer is exempt from the crop rotation and cover cropping requirements in section 205.203(b) and 205.205. In lieu of crop rotation and cover cropping, soil regeneration and recycling practices shall be implemented and documented for the certification agent in order to demonstrate that the required functions/goals of crop rotation and cover cropping listed in 205.205(a, b, c, d) have been achieved through these alternate practices, as applicable to the operation. Specifically:
    - (i) Maintain or improve soil organic matter content (a)- Examples include, but are not limited to, recycling and re-use of growing media, addition of compost and other compostable materials, earthworm replenishment, microbial re-inoculation, etc.
    - (ii) Provide for pest management in crops (b)- Such as soil borne damping-off control through various low temperature heating methods. Soil inoculation using disease suppressant bacteria and fungi.
    - (iii) Manage deficient or excess plant nutrients (c)- Recycle excess plant nutrients contained in drain water from media containers, avoiding so called drain-to-waste systems. Recycled nutrients must be re-used in the greenhouse, or alternatively, on a growing crop outside the facility.
    - (iv) Provide erosion control (d)- Though erosion is not generally applicable to greenhouse production, recycling of drain water prevents off-site movement of nutrients, a common consequence of typical field erosion.
- (b) Growing media ingredients shall be verified by certifying agent and shall not include as ingredients any prohibited materials. Growing media shall be comprised of ingredients that allow for recycling and re-use as growing media within the operation, or alternatively, as a crop input outside the greenhouse. Growing media shall not be disposed of as waste, but should be recycled or reused whenever possible. Growing media shall contain sufficient organic matter capable of supporting natural and diverse soil ecology. For this reason, hydroponic and aeroponic systems are prohibited. Growing media used to produce crop transplants should also be capable of supporting a natural and diverse soil ecology.

- (c) Producers may use full-spectrum light sources.
- (d) Plants and soil shall not be in direct contact with, or indirect contact with condensates from, wood treated with prohibited materials that are used for greenhouse structures or frames of raised beds.
- (e) To comply with the provisions of 205.201(a)(5) to prevent commingling and contamination, organic and non-organic crops can be grown within the same structure only if the following conditions are met:
  - (1) An impermeable wall shall separate organic and non-organic production sites if prohibited materials are applied to the non-organic crop to ensure that cross contamination does not occur.
  - (2) The ventilation systems must ensure that prohibited materials cannot drift, or be otherwise conveyed to the organic production area.
  - (3) Separate watering systems must be established if prohibited fertilizers and/or pesticides are injected within the watering system.
  - (4) Producers must ensure that no contamination occurs to the organic crop through cross-pollination with crops produced through genetic engineering
  - (5) Soil mixing machines and other equipment used for non-organic crop production must be thoroughly cleaned prior to use in organic production.
  - (6) Adequate physical facilities, as determined by the certifying agent, shall separate organic and non-organic crops and production materials in storage, production or holding areas.
  - (7) Organic and non-organic crops and production areas must be conspicuously labeled.

Voting: Motion: Tina Ellor Second: Rigoberto Delgado

Yes: 5 No: 0 Absent: 1 Abstain: 0

NA

**NOSB Final Recommendation  
Greenhouse Production Systems  
October 2001**

Add definition:

*Greenhouse*- Enclosed structure used to grow organic crops, annual seedlings or planting stock used in organic production.

**§205.209 Greenhouse Production Systems**

- (a) Greenhouse operations must meet all applicable requirements of subparts B (205.105) and C (205.200 – 205.206) except that:
  - (1) The producer operating a greenhouse with crops grown in containers is exempt from requirements of 205.202, 205.203(a) and 205.205. In addition, the producer is exempt from the crop rotation and cover cropping requirements in section 205.203(b). The production environment must prevent contact between organically produced crops and prohibited substances as listed in 205.105 throughout the entire production period.
  - (2) The producer of an in-ground permanent soil greenhouse system can seek an exemption from the crop rotation requirements of sections 205.203, and 205.205-205.206 provided that effective alternative strategies for developing and maintaining plant and soil health are established and approved by the certifying agent.
- (b) The use of potting mixtures containing prohibited materials is not allowed.
- (c) Producers may use artificial light sources
- (d) Plants and soil shall not be in direct contact with wood treated with prohibited materials that is used for greenhouse structures or frames of raised beds.
- (g) If a producer is growing both organic and non-organic greenhouse crops, the producer must comply with the provisions of 205.201(a)(5) to prevent commingling and contamination.
- (h) Organic and non-organic crops can be grown within the same structure if the following conditions are met:

1. An impermeable wall shall separate organic and non-organic production sites if prohibited pesticides are applied to the non-organic crop at a time when the organic crop is present.
2. Adequate provisions must be made to prevent contamination of organic crops when producers alternate between organic and non-organic production during different times of the year.
3. The ventilation system must ensure that prohibited materials do not drift to the organic production area.
4. Separate watering systems must be established if prohibited fertilizers and/or pesticides are injected within the watering system.
5. Producers must insure that no contamination occurs to the organic crop through cross-pollination with crops produced through genetic engineering.
6. Soil mixing machines and other equipment used for non-organic crop production must be thoroughly cleaned prior to use in organic production, except that pesticide sprayers used in conventional production can not be used for organic production purposes.
7. Adequate physical facilities, as determined by the certifying agent, shall separate organic and non-organic crops and production materials in storage, production or holding areas.
8. Organic and non-organic crops and production areas must be conspicuously labeled.

**Crops Committee Discussions on Guidance Statements Relative to  
Soil-less Growing Systems  
April, 2008**

The Crops Committee of the NOSB is gathering information and discussing the formation of a recommendation to the NOP for rulemaking on the subject of soil-less growing systems in organic production. Previous discussion or recommendation documents have been put forth by the Crops Committee wherein the term 'hydroponics' has been used. The current committee chooses to drop this term from the title of this and future documents, selecting the more all inclusive 'soil-less growing systems' title.

In 2003, the NOSB Crops Committee issued a proposed guidance document that included the following questions pertaining to the validity of organic certification of soil-less growing systems (with edits and additions by the current committee):

1. *The over-riding question of whether soil-less systems are compatible with organic production.*
2. *Should container culture methods utilizing compost be more appropriately considered as soil-bearing cultures.*
3. *Appropriate guidelines on sources and types of fertilizers to be allowed, such as natural materials made into fertilizers using synthetic extractants or stabilizers, allowed synthetic micronutrients, manure or other animal product based fertilizers (as they relate to food safety issues)*
4. *How to address leaching problems with open systems.*
5. *Appropriate source of media for container culture systems*
6. *Composition of inert ingredients in soil-less media systems*
7. *Disposal vs. recycling of wastes*

*From the same 2003 Guidance, the following recommendation was proposed:*

*Hydroponic and other soil-less systems for crop production are limited to the following, categories:*

1. *Production of higher plants that are naturally aquatic species.*
2. *Production of algal organisms such as spirulina.*
3. *Production systems that utilize compost as a growing media.*

*In aquaponic systems that include fish and plant species, the plant component must also meet the above requirements. Certifiers must validate producer plans that insure that fish effluent is used in a manner that does not lead to a buildup of human pathogens on the crops that are produced.*

These recommendations were never voted on by the full NOSB and are presented here as background for the current Crops Committee work in progress. The questions raised by the 2003 work could also serve as a guide for

public comment from interested parties. The entire 2003 Crops Committee document is attached at the end as Appendix A.

In addition to the topics put forward from the 2003 Guidance, the Crops Committee must consider the following questions:

1. What systems (terrestrial, aquaculture, aquaponic, etc.) should be considered when providing soil-less recommendations?
2. Are soil-less systems currently certified in the US and if so in what areas and for what plants?
3. The question of sustainability of soil-less systems that are completely and perpetually dependent on off-farm inputs.

Lastly, the Committee encourages comment by certifiers regarding these previously presented questions:

1. Do you currently certify any hydroponics (soil-less) operations as organic? If not, why?
2. Do you think that organic certification of hydroponics (soil-less) is appropriate? Why or why not?
3. For hydroponics (soil-less) operations you currently certify, which practices, if any, are difficult to determine if they comply with the intent of standards used for soil?
4. Do you maintain a list of allowed/prohibited substances for use in hydroponics?

The current Crops Committee continues to elicit comment from the public in order to determine the proper status of the various soil-less growing systems with reference to organic certification. It is our intent to intensively study the many and varied forms of these growing methods and produce a formal recommendation by the Spring 2009 NOSB meeting.

## Appendix A

### Crops Committee Recommendations for a Guidance Document Relative to Hydroponics and Other Soil-less Growing Systems: Prepared by Owusu Bandele- 2003

#### Background

In 1995, the NOSB stated that hydroponic production systems could possibly be conducted as organic operations as long as these systems met the other requirements of the national standards. The NOP's current position is that hydroponic systems are already covered by the existing rule (as has been stated by current program leader Mr. Richard Mathews). At the October, 2002 NOSB meeting, the board recommended that producers of spirulina be allowed to use Chilean nitrate as the sole source of nitrogen in their systems until October, 2005. However, neither the TAP review, or the NOSB's decision addressed the issue of whether or not this type of production system qualifies for organic certification.

Since hydroponic systems are already covered by the Final Rule, questions can arise as to what, if any systems actually qualify for organic certification by certifiers, and what yardsticks will certifiers use to make these determinations? Moreover, since so much of organic philosophy and production is built around establishing and maintaining healthy soils, how can soil-less systems be effectively evaluated using the organic standards found in the final rule? More importantly, can hydroponic systems qualify for organic certification?

#### Types of Soil-less Systems

Hydroponic systems utilize fertilizers which are dissolved in solution. There are two basic types: liquid hydroponics and aggregate hydroponics. Liquid systems include the nutrient film technique (NFT), aeroponics, floating raft and noncirculating water culture. The NFT system, which is commonly used in commercial hydroponics, involves a closed, recirculating system. Nutrient from organic sources are available for these systems such as solutions prepared from blood meal, rock phosphate, guano, etc. Aggregate systems involve media mixes in bags, troughs, trenches, or in benches systems. Some aggregate systems are also called drip or substrate systems. Common media include perlite or rock wool.

Questions to consider with "organic" hydroponic systems:

1. The over-riding question of whether soil-less systems are compatible with organic production (which is relevant to all of the systems discussed in this document).
2. Source of fertilizers:
3. Leaching problems with open systems
4. Source of media for aggregate systems
5. Composition of inert ingredients
6. Disposal of wastes

Aquacultural systems involve the production of aquatic plants and animals in somewhat controlled environments. The Aquatic Task Force provided recommendations for the production of most aquatic species of fish. However, the NOSB review of the petition involving the use of Chilean nitrate for spirulina production was assigned to the Crops Committee. Therefore, it is appropriate for the Crops Committee to consider the question of suitability of spirulina production for organic certification.

Questions to Consider (In addition to those cited above)

1. Over the long run, can the systems become more sustainable with less reliance on outside inputs?

Aquaponic systems combine the features of both hydroponics and aquaculture. This is done by recirculating the effluent from fish tanks and using it as a source of nutrients for vegetables grown hydroponically. Using sand or gravel as media. Nitrifying bacteria convert the fish effluent, primarily ammonia, to nitrite and then nitrate, which the plants can use. Diver (**Aquaponics-Integration of Hydroponics With Aquaculture, 2000**) points out several sustainable aspects of aquaponic systems including the following:

- Waste materials from one biological systems are used as a source of food or fuel for a second system;
- The integration of the production of fish and plants increase diversity, and in turn, system sustainability;
- Biological filtration cleanses the water before it leaves the system; and
- It is possible that the only fertility input would be the fish feed.

Questions to consider:

1. Relevance of the source of fish feed (Can the vegetables be considered organic if the fish are not raised organically?).
2. Safety concerns and waiting period between fertigation with fish effluent and harvest of the crops.

Other Soil-less Systems:

Bag cultures involve the growing of crops in a soil-less media. They can be used within aggregate hydroponic systems where liquid fertilizers are applied through the drip system. Media for the bags can include vermiculite, peat moss, rice hulls, and other mixes. In non- hydroponic bag cultures, compost is often added to the bag. Vertical towers are another form of bag culture in which long bags full of soil-less media are hung from beams or wires, and plants are grown through holes or slits in the sides of the bag.

Questions:

1. Should all soil-less bag culture systems be considered along with hydroponics, or only those involved in hydroponic production?
2. What materials are found in the polyethylene bags that are used?
3. How is leaching prevented from the drainage holes in the bags to the greenhouse soil?

Straw bale cultures were used in the greenhouse much more frequently in the past, before the advent of the nutrient film technique and rock wool. Under this system, the greenhouse floor (which could be concrete, or lined with plastic) is covered with straw bales. The bales are normally wetted with compost tea mixtures to expedite heating and decomposition. The bales are then covered with a layer of compost. Organic fertilizers are then applied as topdressings to the bale, and plants can also be foliar-fed.

Shallow bed cultures are another form of soil-less culture in which a thin layer of compost is placed over a plastic woven weed barrier for the production of shallow-rooted herbs and vegetables.

Questions:

1. Should the shallow bed and straw bale cultures be more appropriately considered as soil-bearing cultures, since they both involve the addition of composts? This would also hold true for the bag cultures containing compost.
2. How is leaching of nutrients prevented to the areas surrounding the greenhouse?

Other General Considerations: (Assuming that at least some soil-less systems will be eligible for certification)

1. Several sources have noted an increase in economic feasibility for hydroponic and aquaponic production. How many hydroponic/aquaponic producers are seeking or will be seeking organic certification?
2. Are current certifiers, many of whom have specialized in certification of soilbased systems, qualified to handle this type of certification? If not, how will they be brought up to speed?

Current Status:

Not many hydroponic systems exist world-wide that have obtained organic certification. There are a few operations that produce spirulina in Europe that have obtained organic certification. The United Kingdom does not permit organic certification for hydroponic operations. British Columbia and New Zealand also do not allow for certification of hydroponic production systems.

In the United States, opinions among certifying agents is divided. For example, California Certified of Organic Farmers can certify hydroponic operations if inputs approved for organic production are used while Oregon Tilth will not certify hydroponic systems.

**NOSB Crops Committee  
Soil-less Growing Systems Discussion Item  
May 2009 Meeting**

This document seeks to clarify the NOSB Crops Committee position on soil-less growing systems, such as hydroponics, as they pertain to organic certification to the USDA National Organic Program standards. This clarification represents a portion of the work in progress toward the overall goal of forming an updated NOSB Greenhouse Production Standard recommendation for presentation to the NOP for rulemaking at the Fall 2009 meeting.

**Introduction**

The organic farming method derives its name from the practice of maintaining or improving the organic matter (carbon containing) content of farm soil through various methods and practices. The reason this is the central theme and foundation of organic farming is not inherent to the organic matter itself, but is based on the importance of the organic matter to the living organisms that inhabit soils, particularly for its positive influence on proliferation of diverse populations of organisms that interact in a beneficial way with plant roots. These microscopic organisms, found in abundance in well maintained soils, interact in a symbiotic manner with plant roots, producing the effect of strengthening the plant to be able to better resist or avoid insect, disease and nematode attack, as well as assisting the plant in water and mineral uptake. The abundance of such organisms in healthy, organically maintained soils form a biological network; an amazing and diverse ecology that is 'the secret', the foundation of the success of organic farming accomplished with a minimal need for synthetic fertilizers, insecticides, nematicides, fumigants, etc. In practice, the organic farmer is not just a tiller of the soil, but a steward of the soil ecology on the farm, hence some of the alternate names for this realm of production, such as ecological or biodynamic farming.

**Discussion**

Observing the framework of organic farming based upon its foundation of sound management of soil biology and ecology, it becomes clear that systems of crop production that eliminate soil from the system, such as hydroponics or aeroponics, can not be considered as examples of acceptable organic farming practices. Hydroponics, the production of plants in nutrient rich solutions or moist inert material, or aeroponics, a variation in which plant roots are suspended in air and continually misted with nutrient solution, have their place in production agriculture, but certainly cannot be classified as certified organic growing

methods due to their exclusion of the soil-plant ecology intrinsic to organic farming systems and USDA/NOP regulations governing them.

The OFPA specifically requires an organic plan designed to foster soil fertility (§6513b) and the NOP regulations resulting from the Act bear this out as follows:

§205.203(a)- The producer must select and implement tillage and cultivation practices that maintain or improve the physical, chemical, and biological condition of the soil.

§205.203(b)- The producer must manage crop nutrients and soil fertility through rotations, cover crops, and the application of plant and animal materials.

§205.203(c)- The producer must manage plant and animal materials to maintain or improve soil organic matter content in a manner that does not contribute to contamination...

Clearly, the ramifications of the regulations preclude the exclusion of soil from organic production systems, except for the production of naturally aquatic plant species and mushrooms.

In previous Crops Committee discussion documents, the question has been asked: "Should container culture based growing media (typically utilized in greenhouse systems) that are predominately compost and compostable plant materials be considered 'soil'. As highlighted in earlier portions of this document, a foundational principle of organic farming is the practice of maintaining and nurturing soil health so as to foster the proliferation of the proper soil biology with their accompanying ecologies. Since all typical soil dwelling organisms, such as earthworms, insects, arachnids, protozoa, fungi, bacteria, and actinomycetes can thrive in a properly designed compost based growing media, producing the beneficial symbiotic ecological relationships found in soil, such growing media should be rightfully considered soil. The Committee will be preparing guidelines concerning the proper make-up, handling, and recycling of such growing media as part of the forthcoming updated Greenhouse Production Standards Recommendation mentioned earlier.

**NOSB- Crops Committee Recommendation  
Greenhouse Production Systems  
September, 2009**

**NOSB recommendation for rulemaking pertaining to Greenhouse Production Systems**

**Introduction:**

This recommendation for rulemaking addresses certain aspects of greenhouse production that are commonplace in indoor cropping methods, such as container based rooting media (potting mixtures), hydroponics, and aeroponics. Additionally, provisions are put forth to protect against contamination and commingling of organic crops by non-organic crops in the same greenhouse structure or adjacent ones. For additional discussion and guidance on the topic of hydroponics, aeroponics, and other soil less cropping systems, see the document "NOSB Crops Committee- Soil less Growing Systems, May 2009" attached here as Addendum A.

**Recommendation:**

Add definition:

*Greenhouse*- Enclosed structure used to grow organic crops, annual seedlings or planting stock used in organic production.

**205.209 Greenhouse Production Systems**

- (a) Greenhouse operations must meet all applicable requirements of subparts B (205.105) and C (205.200 – 205.206) except that:
  - (3) The producer operating a greenhouse with crops grown in containers is exempt from requirements of 205.202, 205.203(a).
  - (4) In addition, the container based producer is exempt from the crop rotation and cover cropping requirements in section 205.203(b) and 205.205. In lieu of crop rotation and cover cropping, soil regeneration and recycling practices shall be implemented and documented for the certification agent in order to demonstrate that the required functions of crop rotation and cover cropping listed in 205.205(a,b,c,d) have been achieved through these alternate practices, as applicable to the operation. Specifically:
    - (i) Maintain or improve soil organic matter content (a)- Examples include, but are not limited to, recycling and re-use of potting mixtures, addition of compost and other

compostable materials,, earthworm replenishment, microbial re-inoculation, etc.

- (ii) Provide for pest management in crops (b)- Such as soil borne damping-off control through various low temperature heating methods and soil inoculation using disease suppressant bacteria and fungi.
- (iii) Manage deficient or excess plant nutrients (c)- Recycle excess plant nutrients contained in drain water from soil containers, avoiding so called drain-to-waste systems. Recycled nutrients must be re-used in the greenhouse, or alternatively, on a growing crop outside the facility.
- (iv) Provide erosion control (d)- Though erosion is not generally applicable to greenhouse production, recycling of drain water prevents off-site movement of nutrients, a common consequence of typical field erosion.

(b) The use of potting mixtures containing prohibited materials is not permitted.

- a. Potting mixtures shall be recycled for re-use rather than disposed of as waste.
- b. Potting mixtures devoid of or deficient in organic matter capable of supporting a
- c. natural and diverse soil ecology are prohibited. For this reason, hydroponic and
- d. aeroponic systems are prohibited.

(c) Producers may use full-spectrum light sources.

(d) Plants and soil shall not be in direct contact with wood treated with prohibited materials that is used for greenhouse structures or frames of raised beds.

(e) To comply with the provisions of 205.201(a)(5) to prevent commingling and contamination, organic and non-organic crops can be grown within the same structure only if the following conditions are met:

1. An impermeable wall shall separate organic and non-organic production sites if prohibited materials are applied to the non-organic crop to ensure that cross contamination does not occur.
2. The ventilation system must ensure that prohibited materials do not drift, or are otherwise conveyed to the organic production area.

3. Separate watering systems must be established if prohibited fertilizers and/or pesticides are injected within the watering system.
4. Producers must ensure that no contamination occurs to the organic crop through cross-pollination with crops produced through genetic engineering.
5. Soil mixing machines and other equipment used for non-organic crop production must be thoroughly cleaned prior to use in organic production, except that pesticide sprayers used in conventional production can not be used for organic production purposes.
6. Adequate physical facilities, as determined by the certifying agent, shall separate organic and non-organic crops and production materials in storage, production or holding areas.
7. Organic and non-organic crops and production areas must be conspicuously labeled.

## **Addendum A-**

### **National Organic Standards Board Crops Committee Soil-less Growing Systems May 2009**

This document seeks to clarify the NOSB Crops Committee position on soil-less growing systems, such as hydroponics, as they pertain to organic certification to the USDA National Organic Program standards.

## **Introduction**

The organic farming method derives its name from the practice of maintaining or improving the organic matter (carbon containing) content of farm soil through various methods and practices. The reason this is the central theme and foundation of organic farming is not inherent to the organic matter itself, but is based on the importance of the organic matter to the living organisms that inhabit soils, particularly for its positive influence on proliferation of diverse populations of organisms that interact in a beneficial way with plant roots. These microscopic organisms, found in abundance in well maintained soils, interact in a mutualistic manner with plant roots, producing the effect of strengthening the plant to be able to better resist or avoid insect, disease and nematode attack, as well as assisting the plant in water and mineral uptake. The abundance of such organisms in healthy, organically maintained soils forms a biological network, an

amazing and diverse ecology that is ‘the secret’, the foundation of the success of organic farming accomplished without the need of synthetic insecticides, nematicides, fumigants, etc. In practice, the organic farmer is not just a tiller of the soil, but a steward of the soil ecology on the farm, hence some of the alternate names for this realm of production, such as ecological or biodynamic farming.

## **Discussion**

Observing the framework of organic farming based upon its foundation of sound management of soil biology and ecology, it becomes clear that systems of crop production that eliminate soil from the system, such as hydroponics or aeroponics, can not be considered as examples of acceptable organic farming practices. Hydroponics, the production of plants in nutrient rich solutions or moist inert material, or aeroponics, a variation in which plant roots are suspended in air and continually misted with nutrient solution, have their place in production agriculture, but certainly cannot be classified as certified organic growing methods due to their exclusion of the soil-plant ecology intrinsic to organic farming systems and USDA/NOP regulations governing them.

The OFPA specifically required an organic plan designed to foster soil fertility (§6513b) and the NOP regulations resulting from the Act bear this out as follows:

§205.203(a)- The producer must select and implement tillage and cultivation practices that maintain or improve the physical, chemical, and biological condition of the soil.

§205.203(b)- The producer must manage crop nutrients and soil fertility through rotations, cover crops, and the application of plant and animal materials.

§205.203(c)- The producer must manage plant and animal materials to maintain or improve soil organic matter content in a manner that does not contribute to contamination...

Although the regulations do not specifically state ‘soil only production’, the exclusion of soil from organic production of normally terrestrial, vascular plants violates the intent of the regulations. This intent can be seen in these sections of the rule that require proper stewardship toward improving and maintaining the soil ecology within an organic farming system. It is pointed out that naturally aquatic plant species and non-vascular plant species such as mushrooms come from different (non-soil) ecological niches and would be handled separately.

In previous Crops Committee discussion documents, the question has been asked: “Should container culture based growing media (typically utilized in greenhouse systems) that are predominately compost and compostable plant materials be considered ‘soil’. As highlighted in earlier portions of this document,

a foundational principle of organic farming is the practice of maintaining and nurturing soil health so as to foster the proliferation of the proper soil biology with their accompanying ecologies. Since all typical soil dwelling organisms, such as earthworms, protozoa, fungi, bacteria, actinomycetes, etc. can thrive in a properly designed compost based growing media, producing the beneficial symbiotic ecological relationships found in soil, such growing media should be rightfully considered soil.