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Submitted via www.regulations.gov

RE: Document # AMS-NOP-17-0024

NOSB Crops Subcommittee Discussion on Field and Greenhouse Container Production

Dear NOSB members:

Thank you for the opportunity to provide comments on the Field and Greenhouse Container Production Discussion Document. MOSA certifies approximately 2000 organic operations throughout the United States including 349 clients certified for greenhouse production and several hundred operations for vegetable and/or fruit. We do not currently have a way to measure how many of our certified clients grow their crops in containers and do not grow any of the excluded crops, but we know that many of our greenhouse operations raise container grown crops and, of the vegetable and fruit growers we certify growing crops outdoors, we can assume that some crops are grown in containers as well.

We support the organic community having this discussion and the development of guidance as needed, however we are concerned with the proposed standard for container production. *"For container production to be certified organic, a limit of 20% of the plants' nitrogen requirement can be supplied by liquid feeding, a limit of 50% of the plants' nitrogen requirement can be added to the container after the crop has been planted, and the container substrate must be at least 50% soil and/or compost by volume. For perennials, the nitrogen feeding limit is calculated on an annual basis. Transplants, ornamentals, herbs, and aquatic plants are exempted from these requirements."* We recognize that fertility applications for all types of crops could be addressed better, but at this juncture, where certifiers do not have similar measurement requirements in place for field grown crop production, nor do we have the resources available to make such calculations, we feel that this proposal would put an unfair recordkeeping requirement on organic container growers and would add considerably to the certification and inspection process. We also recognize that the standard as stated in this proposal varies significantly from the proposal as stated in the Hydroponics and Container-Growing Recommendations, where it is to be voted on. This document additionally includes a composition requirement for the container substrate. It is imperative for the organic

community to be presented with complete and consistent information for consideration. The NOSB should discuss and resolve the inconsistency between documents and also clarify whether or not the language applies to the prohibition on hydroponic production.

According to the document, the subcommittee intends this discussion include consideration of the issues being discussed as applicable to either container production or field grown crops. *"In order to have a robust and transparent interaction, these issues are being brought to the public for discussion. While the examples and issues being considered in this document are part of a container production system, if the same issues are found in greenhouse or field grown crops, it would be assumed that any future proposed regulations would apply to them as well." [Emphasis added]* We have developed our replies considering also field grown crop production.

1. Should the use of artificial light be limited to a specific number of hours per day? Describe your rationale for how many hours should be permitted.
Plants do have a circadian rhythm that, like humans, can be adjusted and disrupted by external cues including the hours of light they receive each day. A 2012 study on flowering cabbage showed that "*the plant gave off a pungent chemical, a naturally produced pesticide to ward off cabbage loopers by anticipating the caterpillars typically eating time as triggered by light.*" This diurnal rhythm was disrupted by exposing the flowering cabbage to a 12 hr light - dark cycle that was out of phase with the natural light cycle around it. Another study showed that glucosinolate accumulation was also disrupted by exposing cabbage to 24 hour periods of light. Glucosinolates affect flavor and, more importantly, have been identified as potent anticancer phytochemicals. Under constant light or darkness, some emergent circadian behaviors become progressively dampened in their rhythm and some are lost.[1]

Harvest yields of cucumbers and corn showed no net loss when plants were exposed to 24 hrs of light. However, sweet peppers and tomatoes actually decrease yields and their leaves blistered when given too much light. Some research additionally indicates that giving plants at least 5 -6 hours of dark does not significantly disrupt growth or processes such as their natural defenses. At this time, MOSA does not have a recommendation regarding the specific number of hours per day plants should be exposed to light. However, we support continued research in this area and the development of requirements that are balanced with the healthy circadian rhythms of plants and a practical approach for all growers.

2. Should the spectrum and intensity of artificial light be limited to full spectrum, which is as close to natural daylight as possible, or should other types of lighting, such as those that emit the red or ultraviolet spectrum of light or modified intensities, be allowed? Describe your rationale for the spectrums and intensities of artificial light for use in container operations.

Different spectrums of light are responsible for determining when perennial plants grow, flower and fruit and also affect diurnal processes within the circadian rhythms. Indoor growers need to have a light that emits the proper type of light wavelengths for their plants and the plants' life cycles. When looking at light and photosynthesis, red and blue light are by far the two most

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[1] Danielle Goodspeed, John D. Liu, E. Wassim Chehab, Zhengji Sheng, Marta Francisco, Daniel J. Kliebenstein, Janet, Postharvest Circadian Entrainment Enhances Crop Pest Resistance and Phytochemical Cycling, published by Curret Biology, Volume 23, p123501241, 8 July 2013

important colors concerning plant growth. Red and blue are absorbed by the chlorophyll pigments very efficiently. Internode length growth can be kept short with exposure to 400 - 500 nanometers (nm) (blue), 560 - 590 nm (yellow) is absorbed by some plant pigments and can be linked to flowering and the production of carotenoids, and 700 - 750 nm (far-red) is involved with flowering, stem elongation and is used to keep track of day length and the circadian rhythm of certain plant species.

MOSA encourages continued research and the continued development of proposals that uphold organic integrity and are practically applicable to a variety of site specific (region, seasonal) growing requirements.

3. Should the use of synthetic mulches which remain in place for numerous years, especially in an outdoor production setting, address the issues of soil and water quality as well as natural resource maintenance and improvement elaborated in this discussion document? Please describe the issues you feel are important and how they might be addressed.

Synthetic mulches are allowed for use in all types of crop production and the NOSB's intention that field grown crop production also be considered is significant for this question. Synthetic mulch used in field grown perennial production may also remain in place for years as an allowed practice according to NOP 5034-1 *"Plastic Mulch - Petroleum-based plastic mulch, other than polyvinyl chloride (PVC), is permitted. The allowance does not include biodegradable plastic. Plastic mulch must be removed from the field at the end of the growing or harvest season. For crops grown as annuals, removal must occur annually. For perennial crops, plastic mulch must be removed before the plastic decomposes or breaks down to prevent removal."* We would support the idea that the use of plastic mulches in container production fit a similar rule as is currently applied with field grown crops. If the crop is annual, the mulch must be removed at the end of the growing season, and for perennials, the mulch must be removed when production is complete, or before the plastic decomposes or breaks down preventing removal.

4. Should the composting and field spreading of crop residue and substrates from container operations, and the recycling of plastic or non-compostable containers, be addressed within the NOP organic certification system?
We agree that the reuse and recycling of media, containers, and mulch is an important point to consider and we do support that all aspects be considered in this discussion. We'd like to see as much reuse and recycling as feasible but recognize that such activities may not always be possible. Likewise, we would like to see the use of plastic in field grown crop production and in storage of crops addressed as well. While we are aware of some recycling facilities for ag plastic, we understand that the majority of plastic and fabric ends up in landfills, a problem that needs to be solved overall.

Field spreading of crop residue and substrates should also be considered and addressed. Organic production must consider impact on the larger system of which it is a part. Disposal of organic system by-products must be environmentally responsible. And further, sound cycling of resources can help a greenhouse to benefit a farm's larger organic system, which includes other types of production. For example, greenhouse waste must not contribute to contamination of

crops, soil or water (reference Standards section 205.203(c)), and further, composting of waste could cycle resources back into the greenhouse, or toward field crops or other parts of an organic operation.

In closing, we appreciate the NOSB having these difficult conversations and encourage development of proposed recommendations which are clear and enforceable, and are considered comparatively to soil based and other types of allowed production. Thank you for your work on this challenging and precedent-setting issue.

Respectfully submitted,

The MOSA Certification Team