Organic Hydroponics and Aquaponics

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Current Status

- The USDA organic regulations do not currently prohibit hydroponic production. Certification to the USDA organic standards is currently allowed, as long as the certifier can demonstrate it is certifying in a way that complies with the standard.

NOSB Recommendations

- 1995: “Hydroponic production in soilless media to be labeled organically produced shall be allowed if all provisions of the OFPA have been met.”
- 2010: “Growing media shall contain sufficient organic matter capable of supporting natural and diverse soil ecology. For this reason, hydroponic and aeroponic systems are prohibited.”

Hydroponic and Aquaponic Task Force

- Composition: individuals that represent both the soil-based organic and hydroponic and aquaponics communities; technical expertise.

- Objectives:
  - Describe hydroponic and aquaponic systems and practices.
  - Examine how hydroponic and aquaponic methods align or conflict with OFPA and the USDA organic regulations.
  - Explore alternatives.

Hydroponics and Aquaponics Subcommittee

Definitions

Hydroponics - the growing of plants in *mineral nutrient solutions* with or without an inert growing media to provide mechanical support

Agreed – Should be prohibited

Reasons:

- Unapproved inputs
- Insufficient carbon and biology in system
- No nutrient cycling

Emerging Technologies

Bioponics - a contained and controlled growing system in which plants derive nutrients from organic substances in water and/or growing media which are released by the biological activity of microorganisms throughout the system

- **Modified hydroponic systems that use the same organic inputs, processes, and principles as field growers.**

Emerging Technologies

Alignment with organic principles

- All inputs compliant with The National List, including media
- Sufficient organic matter is added to the system to support microbial diversity
- Biology is added and maintained in the system such that nutrient cycling is achieved
- Natural resources of farm site are conserved, soil and water quality are not degraded (any excess fertilizer is captured and re-purposed)

Example 1:

Aquaponics

A system of aquaculture in which the waste produced from farmed fish or other aquatic animals supplies nutrients for plants grown hydroponically, which in turn purify the water

Example 2: Bioponic Tomatoes

Tomatoes grown in a base of organic coconut husk

Crop nutrition

- Solid and liquid plant, animal, and OMRI-approved minerals

Biology

- Media is inoculated with compost tea
- Earthworms

Example 3: Bioponic Lettuce Systems

Lettuce started in an organic base of coconut husk and/or compost

Crop nutrition

- Liquid organic fertilizer such as fermented plant materials or compost teas are added to a re-circulating water system

Biology

- Compost tea, microbes from biofilter in the system, or other microbial inoculant products (OMRI-approved)

2010 Recommendations state that container culture based growing media (typically used in greenhouse systems) that are predominantly compost or compostable plant materials should be rightly considered soil.

Agreed – And other bioponic container systems should also rightly be included.

Reasons:

- All soil-dwelling organisms in the soil food web can thrive in a compost or bioponic growing media or container system

Bioponic growing systems:

- Because they are container systems, they **maintain** the site soil.
- No need to perform soil crop rotations or cover cropping.
- Run-off drainage does not contribute to surface or groundwater contamination since it is captured and re-purposed.

Our subcommittee came to the conclusion that the intent of the organic regulations is:

1) to be able to grow foods in a way that provides the least harm to the earth's soil, water, and biological communities in the soil.
2) for production systems to integrate cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity.
3) To grow foods that are chemical-free and healthy

How does the public view organic foods?

- Numerous surveys have been conducted in the U.S. and abroad (Consumer Reports (2014); (Idda, Madau, & Pulina, 2008; Rabb & Grobe, 2005)
- Consumers associate "organic" with **chemical-free**, **healthy and nutritious**, and **environmentally friendly**.
- They do not associate "organic" with "grown in the soil".

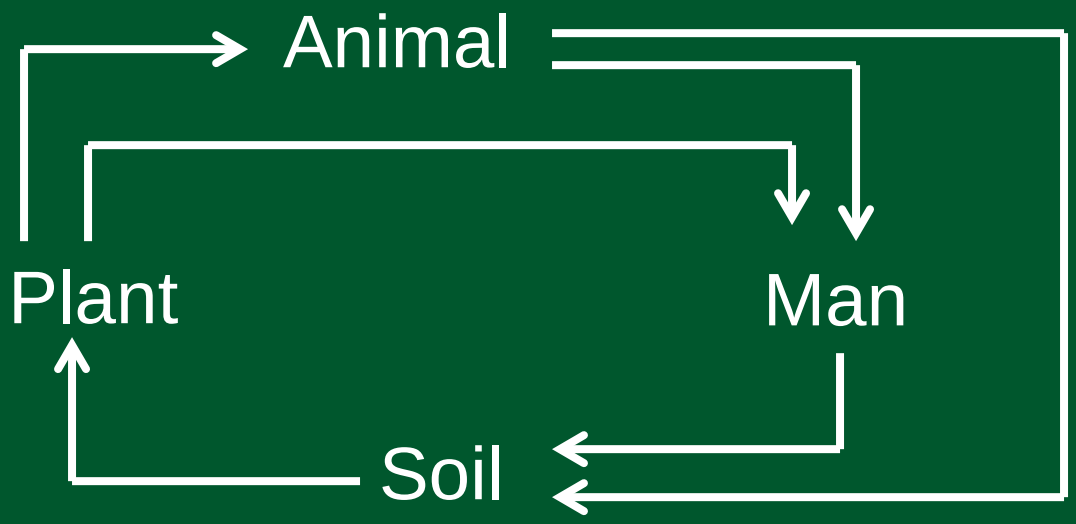
Soil 2010 Subcommittee
Brief Summary of Report in Preparation

USDA Hydroponic Aquaponic (HPAP) Task Force
to National Organic Standards Board
April 25, 2016

Subcommittee Members

- John Biernbaum, MSU and MOFFA
- Dave Chapman, Greenhouse Organic Farmer
- Jeffry Evard, Ecocert ICO
- Theresa Lam, NOFA-NJ
- Amy Lamendella, CCOF
- Eric Sideman, MOFGA
- Sam Welsch, OneCert

Organic Farming is an Integrated System



Feed the Soil – Not the Plant.

Why Organic?

Healthy People

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Healthy Animals

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Healthy Plants

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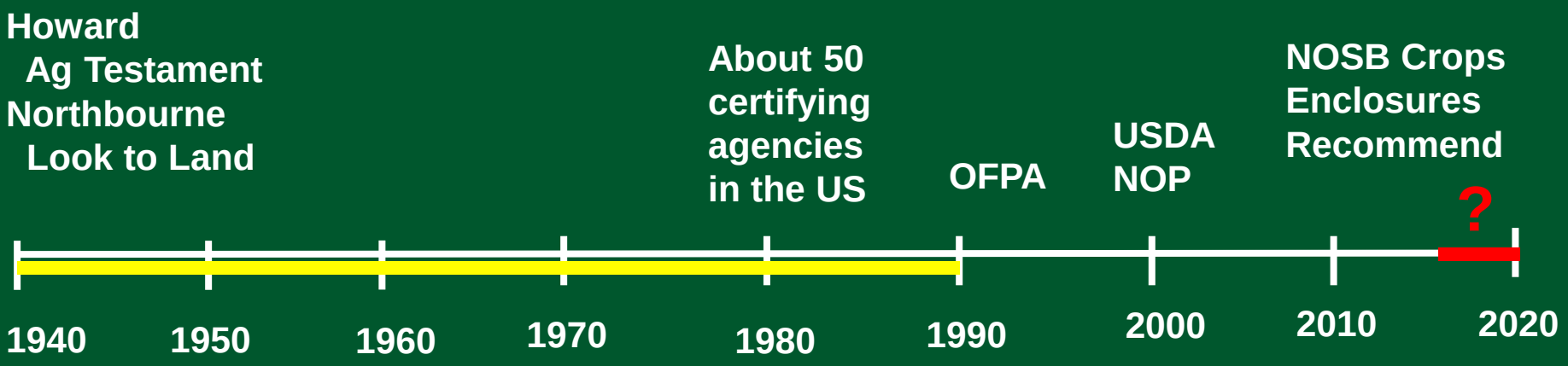
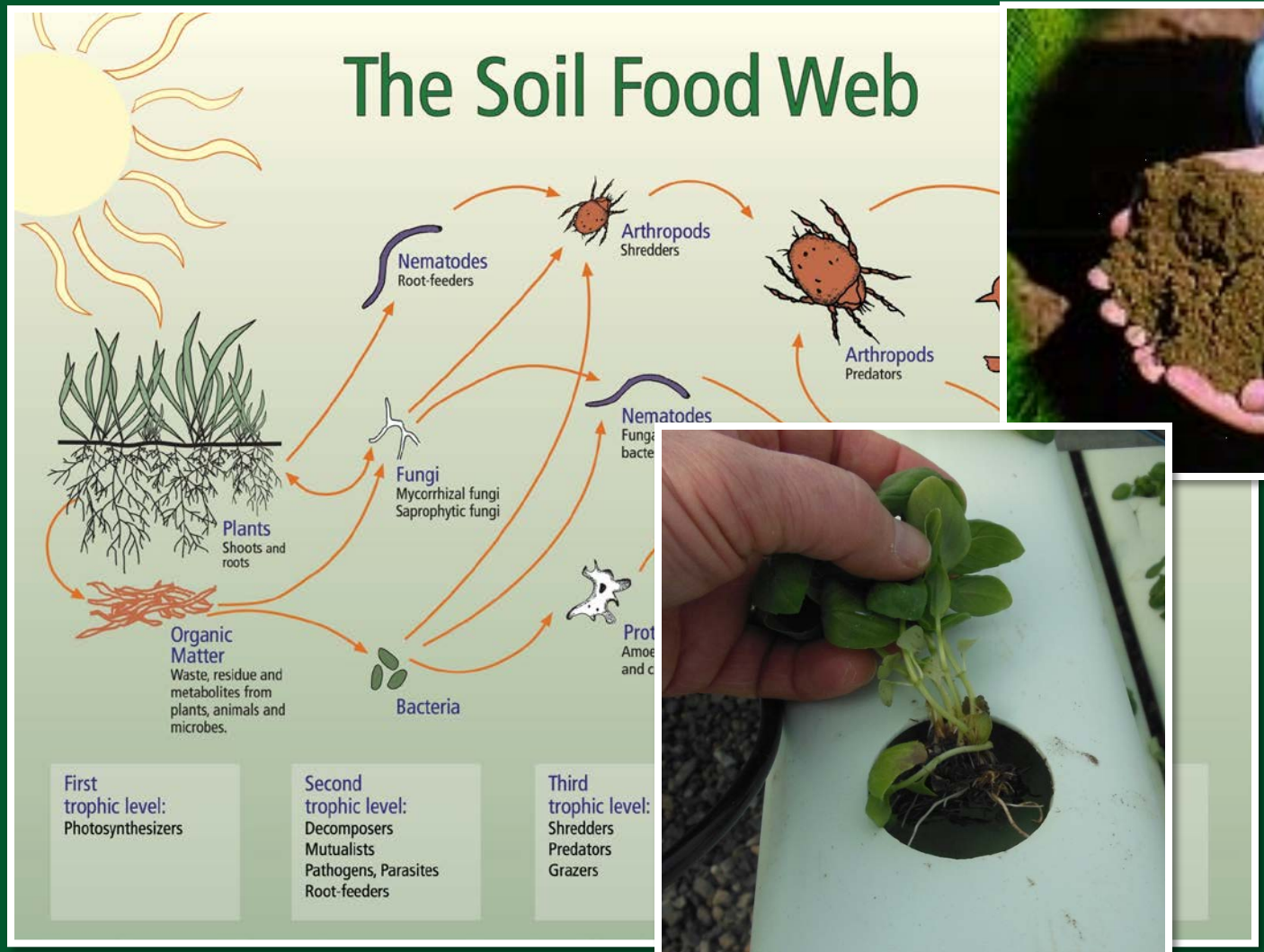
Healthy Soils

Howard; An Agricultural Testament

Organic Farming Certification Time Line



Organic Agriculture is Organic Matter, Soil Biology and Much More



Broad Contributions of Organic Matter and Biology to Soil Structure, Water and Fertility

Biological Contributions
- nutrient availability
- nutrient cycling
- disease management

Physical Contributions
- aggregation & structure
- water absorption & retention

Chemical Contributions
- exchange capacity
- pH buffering

Regulations: OFPA (1990)

- §6513. Organic plan
  - (b)(1): “Soil fertility - An organic plan shall contain provisions designed to foster soil fertility, primarily through the management of the organic content of the soil through proper tillage, crop rotation, and manuring.”

Regulations: OFPA (1990)

- §6512. Other production and handling practices; If a production or handling practice is not prohibited or otherwise restricted under this chapter, such practice shall be permitted unless it is determined that such practice would be inconsistent with the applicable organic certification program.

Regulations: USDA Organic (2000)

- §205.203 Soil fertility and crop nutrient management practice standard:
- (a) The producer must select and implement tillage and cultivation practices that maintain or improve the physical, chemical, and biological condition of soil and minimize soil erosion.
- (b) The producer must manage crop nutrients and soil fertility through rotations, cover crops, and the application of plant and animal materials.

Regulations: International

- Alignment with key trading partners' policies—Canada, E.U. Mexico
- In ground, with limited exceptions
- Canada / Scandinavia and containers

Rigor: 2010 Recommendation Issues

1. Enclosures - definition
   - Greenhouses – transparent roof
   - Controlled Indoor Environments
2. Enclosure 3-year Land Requirement
3. Lighting - electrical? supplemental?
4. Containers – how defined?
5. Growing Media and Compost
6. Rotations – required or exempt? Why?

Annual Seedlings / Transplants

Enclosure and Container Considerations

Report

- Position: Hydroponic systems cannot meet key requirements for organic production as laid out in OFPA and the USDA organic regulations.
- These systems do not align with the founding principle of organic agriculture: sound management of soil biology, ecology, and overall soil health.

Options?

- Limit organic certification to what is grown in the ground
- Limit organic certification to what is grown in the ground and in containers, with clear restrictions for enclosures, lighting and fertility.