

General Guidelines for Organic Crop Production¹

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In 1990, Congress passed The Organic Foods Production Act, part of the 1990 Farm Bill, requiring the USDA to develop national standards for organically produced agricultural products. This was done to assure consumers that agricultural products marketed as organic meet consistent, uniform standards. After ten years of debate and discussion, the final rule of the National Organic Program (NOP) was published in the Federal Register on December 21, 2000 but not fully implemented until October 21, 2002. This final rule codifies the standards of the National Organic Program and refers to specific regulations whereas the National Organic Program refers to the overall program established by the federal Organic Foods Production Act of 1990. The full text of the final rule, is available at <http://www.ams.usda.gov/nop/NOP/standards/FullText.pdf>, and contains information about all aspects of organic certification, production, packaging, processing, labeling, and retailing.

The final rule of the NOP contains both general guidelines about organic production and a National List of primary or generic lists of allowed, regulated, and prohibited inputs of synthetic and nonsynthetic materials as well as conditions regulating their use. For example, copper hydroxide and some other copper fungicides can be used for disease control but

must be used in a way that minimizes copper accumulation in soil. Mined sodium nitrate can be used as a fertilizer but only to satisfy 25% of the crop nitrogen requirement because of soil salinity problems. However, the National List does not contain brand name products or manufacturers. That information is offered by the Organic Materials Review Institute (OMRI at <http://www.omri.org>), a private company that, for a fee, reviews and lists agricultural inputs for their suitability in certified organic production. Note: The National List of organic inputs is not a permanent list. A sunset provision provides for materials to remain on the National List for five years but this time could be reduced. The OMRI list may also contain similar provisions.

Using the final rule of the National Organic Program as a basis, our purpose here is to provide general guidelines for organic crop production, either directly or indirectly restating provisions of the final rule. The sections of the final rule in the Federal Register of December 21, 2000 are listed for topics presented here. A complete index to the National Organic Program can be found at <http://www.nal.usda.gov/afsic/ofp/7cfrtoc.htm>. Since regulations affecting organic production are complex, detailed, and can vary according to national and

1. This document is HS972, one of a series of the Horticultural Sciences Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Publication date: March 2004. Please visit the EDIS Web site at <http://edis.ifas.ufl.edu>.

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international organic standards, growers should consult with their respective USDA-approved organic certifying agencies to resolve further questions.

An Organic System Plan (Production and Handling Preamble)

An organic system plan contains six components as follows.

1. The organic system plan must describe the practices and procedures used, including the frequency with which they will be used, in the certified operation.
2. It must list and characterize each substance used as a production or handling input, including the documentation of commercial availability, as applicable.
3. It must identify the monitoring techniques which will be used to verify that the organic plan is being implemented in a manner which complies with all applicable requirements.
4. It must explain the record keeping system used to preserve the identity of organic products from the point of certification through delivery to the customer who assumes legal title to the goods.
5. The organic system plan must describe the management practices and physical barriers established to prevent commingling of organic and nonorganic products on a split operation and to prevent contact of organic production and handling operations and products with prohibited substances.
6. The organic system plan must contain the additional information deemed necessary by the certifying agent to evaluate site-specific conditions relevant to compliance with these or applicable State program regulations. Producers or handlers may submit a plan developed to comply with other Federal, State, or local regulatory programs if it fulfills the requirements of an organic system plan.

An important point is that organic production, packing, processing, marketing, and retailing practices are highly regulated by federal, state, local,

and for the global market, international agencies. Land grant faculty can conduct research and educational programs on organic farming issues but the involved USDA-approved organic certifying agency has the authority to approve production and handling practices, plans, and inputs.

Land Requirements (Section 205.202)

Land requirements for organic certification require that no prohibited substances have been applied for three years prior to certification. Also, that the land have defined boundaries and buffer zones to prevent the unintended application of a prohibited substance to the crop or contact with a prohibited substance applied to adjoining land that is not under organic management.

Synthetic and Nonsynthetic Substances

In general, all natural or nonsynthetic substances are allowed in organic production and all synthetic substances are prohibited. However, the National List of allowed synthetic and prohibited nonsynthetic substances contains exceptions to this rule. Biosolids or sludge (even when composted), genetically modified organisms, ionizing radiation, and fertilizers, plant and animal materials containing synthetic substances not included on the National List also cannot be used.

Soil Fertility and Crop Nutrient Management Practice Standard (Section 205.203)

- Implement tillage and cultivation practices to maintain or improve the physical, chemical, and biological condition of soil and minimize soil erosion.
- Manage crop nutrients and soil fertility through rotations, cover crops, and application of plant and animal materials.
- Manage plants and animal materials to maintain or improve soil organic matter in a manner that does not contribute to contamination of crops, soil, or water by plant nutrients, pathogenic

organisms, heavy metals, or residues of prohibited substances.

Animal and Plant Materials

Raw Animal Manure

- Manure is defined in the NOP as "Feces, urine, other excrement, and bedding produced by livestock that has not been composted."
- Can be applied to land used for a crop not intended for human consumption.
- Must be incorporated into the soil not less than 120 days prior to harvest of a product that comes into contact with the soil surface or soil particles.
- Must be incorporated into the soil not less than 90 days prior to harvest of a product that does not come into contact with the soil surface or soil particles.

Composted Plant and Animal Materials

- Established an initial carbon:nitrogen ratio between 25:1 and 40:1
- Maintain temperature between 131°F and 170°F for 3 days using an in-vessel or static aerated pile system
- Maintain temperature between 131°F and 170°F for 15 days using a windrow composting system, turning the materials at least five times

Note that after manure is composted, it is a composted animal material and no longer must be applied according to the raw animal manure regulations.

Uncomposted Plant Materials

- Allowed crop nutrients or soil amendments
- Mined substance of low solubility
- Mined substance of high solubility used in compliance with the conditions established on the National List of nonsynthetic materials prohibited for crop production

- Ash obtained from the burning of a plant or animal material. Burning may be used to suppress the spread of disease or to stimulate seed germination but may not be used to dispose of crop residues produced on the operation.

Standards for Organic Seeds and Planting Stock (Section 205.204)

In general, growers must use organically grown seeds, annual seedlings, and planting stock, if available. If not available, the following regulations apply and should be documented.

- Nonorganically Produced, Untreated Seeds and Planting Stock may be used when an equivalent organically produced variety is not commercially available except that organically produced seed must be used for the production of edible sprouts.
- Nonorganically Produced Seeds and Planting Stock Treated with an Approved Synthetic Substance may be used when an equivalent organically produced or untreated variety is not commercially available.
- Seeds, Annual Seedlings, and Planting Stock Treated with Substances Prohibited under the National Organic Program may be used to produce an organic crop when these prohibited substances are required by Federal or State phytosanitary regulations.
- Nonorganically Produced Annual Seedlings may be used to produce an organic crop as a temporary variance upon the written approval by the administrator of the USDA Marketing Service.
- Nonorganically Produced Planting Stock for Perennial Crops, if maintained for at least one year under organic management systems, may be sold, represented, or labeled as organically produced planting stock. *For example, citrus nursery trees purchased from a conventional nurseryman and grown organically for one year could then be sold as organic nursery trees.* This would include citrus rootstock, liners, and budded nursery trees.

Crop Rotation Practice Standard (Section 205.205)

The producer must implement a crop rotation including but not limited to sod, cover crops, green manure crops, and catch crops that provide the following functions:

- Maintain or improve soil organic matter content
- Provide for pest management in annual and perennial crops
- Manage deficient or excess plant nutrients
- Provide erosion control

Crop Pest, Weed, and Disease Management Practice Standard (Section 205.206)

The producer must use management practices to prevent crop pests, weeds, and diseases including:

- Crop rotation and soil and crop nutrient management practices
- Sanitation measures to remove disease vectors, weed seeds and habitat for pest organisms
- Cultural practices that enhance plant health like selection of plant species and varieties with regard to suitability to site-specific conditions and resistance to prevalent pests, weeds, and diseases

Pest problems may be controlled through mechanical or physical methods including:

- Augmentation or introduction of predators or parasites of the pest species
- Development of habitat for natural enemies of pests
- Nonsynthetic controls such as lures, traps, and repellants

Weed problems may be controlled through the following:

- Mulching with fully biodegradable materials
- Mowing
- Livestock grazing
- Hand weeding and mechanical cultivation
- Flame, heat, or electrical means
- Plastic or other synthetic mulches if removed at the end of the season

Disease problems may be controlled through the following:

- Management by management practices that suppress the spread of disease organisms
- Application of nonsynthetic biological, botanical or mineral inputs or by allowed synthetic substances documented in the organic plan

Wild-Crop Harvesting Practice Standard (Section 205.207)

A wild crop that is intended to be sold, labeled, or represented as organic must be harvested from a designated area that has had no prohibited substance applied to it for a period of three years prior to harvest.

Furthermore, wild crops must be harvested in a manner that ensures that such harvesting or gathering will not be destructive to the environment and will sustain the growth and production of the wild crop.

Synthetic Substances Allowed in Organic Crop Production (Section 205.601)

As algicides, disinfectants, and sanitizers, including irrigation systems and cleaning systems:

- Alcohols
- Ethanol
- Isopropanol

- Chlorine materials (*Except* that residual chlorine levels in the water shall not exceed the maximum residual disinfectant limit under the Safe Drinking Water Act (10 ppm))
- Calcium hypochlorite
- Chlorine dioxide
- Sodium hypochlorite
- Hydrogen peroxide
- Soap-based algicide/demisters

As herbicides, weed barriers:

- Herbicides, soap-based - for use in farmstead maintenance (roadways, ditches, right of ways, building perimeters) and ornamental crops
- Mulches
 - newspaper or other recycled paper, without glossy or colored inks
 - plastic mulch and covers (petroleum-based other than polyvinyl chloride (PVC))

As compost feedbacks:

- Newspaper or other recycled paper, without glossy or colored inks

As animal repellants:

- Soaps - ammonium - for use as a large animal repellent only, no contact with soil or edible portion of crop

As insecticides (including acaricide or mite control):

- Ammonium carbonate - for use as bait in insect traps only, no direct contact with crop or soil
- Boric acid - structural pest control, no direct contact with organic food or crops
- Elemental sulfur
- Lime sulfur - including calcium polysulfide

- Oils, horticultural
 - narrow range oils as dormant, suffocating, and summer oils.
- Soaps, insecticidal
- Sticky traps/barriers

As insect management - Pheromones (compounds commonly used for insect mating disruption):

- The National Organic Standards Board (NOSB) annotation for pheromones, adopted 10/20/02, which was based on EPA recommendations, should be adopted as a policy guidance statement for 205.601(m)(2) to read as follows: Pheromones -includes only EPA-exempt pheromone products, EPA-registered pheromone products with no additional synthetic toxicants unless listed in this section, and any inert ingredients used in such pheromone formulations that are not on EPA List 1 (Inerts of toxicological concern) or EPA List 2 (Potentially toxic inerts), *Provided* the pheromone products are limited to passive dispensers. Pheromone products containing only pheromones, active ingredients listed in this section, and List 4 inerts may be applied without restriction.

As rodenticides:

- Sulfur dioxide - underground rodent control only (smoke bombs)
- Vitamin D₃

As slug or snail bait:

- none

As plant disease control:

- Coppers, fixed
 - copper hydroxide
 - copper oxide
 - copper oxychloride

- includes products exempted from EPA tolerance, *Provided*, that, copper-based materials must be used in a manner that minimizes accumulation in the soil and shall not be used as herbicides.
- Hydrated lime - for use with copper sulfate which must be used in a manner that minimizes copper accumulation in the soil
- Hydrogen peroxide
- Lime sulfur
- Oils, horticultural, narrow range oils as dormant, suffocating, and summer oils
- Potassium carbonate
- Elemental sulfur
- Streptomycin, for fire blight control in apples and pears only
- Tetracycline (oxytetracycline calcium complex), for fire blight control only

As plant or soil amendments:

- Aquatic plant extracts (other than hydrolyzed) - Extraction process is limited to the use of potassium hydroxide or sodium hydroxide; solvent amount used is limited to that amount necessary for extraction
- Elemental sulfur
- Humic acids - naturally occurring deposits, water and alkali extracts only
- Lignin sulfonate - chelating agent, dust suppressant, flotation agent
- Magnesium sulfate - allowed with a documented soil deficiency
- Micronutrients -not to be used as a defoliant, herbicide, or desiccant. Those made from nitrates or chlorides are not allowed. Soil deficiency must be documented by testing.
- Soluble boron products

- Sulfates, carbonates, oxides, or silicates of zinc, copper, iron, manganese, molybdenum, selenium and cobalt
- 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. Vitamins B₁, C, and E

As plant growth regulators:

- Ethylene- for regulation of pineapple flowering

As floating agents in postharvest handling:

- Lignin sulfonate
- Sodium silicate - for tree fruit and fiber processing

As synthetic inert ingredients:

- As classified by the EPA for use with nonsynthetic substances or synthetic substances listed in this section and used as an active pesticide ingredient in accordance with any limitations on the use of such substances.
- EPA List 4-Inerts of Minimal Concern at <http://www.epa.gov/opprd001/inerts/lists.html>

Nonsynthetic Substances Prohibited for Use in Organic Crop Production (Section 205.602)

- Ash from manure burning
- Arsenic
- Lead salts
- Sodium fluoaluminate (mined)
- Strychnine
- Tobacco dust (nicotine sulfate)
- Potassium chloride - unless derived for a mined source and applied in a manner that minimizes chloride accumulation in the soil

- Sodium nitrate -unless use is restricted to no more than 20% of the crop's total nitrogen requirement

Tolerance Levels in Organic Products (Section 205.671)

Organically grown produce with greater than 5% of the EPA's tolerance for a specific prohibited substance cannot be sold, labeled or represented as organically produced.

When a prohibited substance is applied to a certified operation due to a Federal or state emergency pest or disease treatment program and the operation otherwise meets requirements, the certification status of the operation shall not be affected as a result of the application of the prohibited substance. However, any harvested crop or plant part to be harvested that has contact with a prohibited substance applied as the result of a Federal or State emergency pest or disease treatment program cannot be sold, labeled, or represented as organically produced (Section 205.672). *Even if, as a result of federal or state emergency pest or disease programs, organically grown crops have less than 5% of EPA tolerance levels, these crops still cannot be sold as organic. However, note that in this situation, organic certification for the land is not cancelled.*

If an organic farm is located in an area to be treated with a prohibited pesticide as part of a Federal or state emergency pest or disease treatment program (e.g. aerial sprays or malathion to control Mediterranean fruit fly), the owner/manager of the organic farm can contact the Florida Department of Agriculture to request his farm not be sprayed. However, after aerial spraying of the general area has been completed, crops on the organic farm that have not been sprayed with malathion should be tested for possible malathion residues before marketing the crop as organic.

Genetically Modified Organisms (GMOs) Prohibited (7CFR Part 205)

Methods used to genetically modify organisms or influence their growth and development by means that are not possible under natural conditions or

processes and are not considered compatible with organic production - from the National Organic Program.

Note: Organisms developed using Excluded Methods cannot be used in organic production but organisms developed using Included Methods can be used in organic production.

Excluded methods:

- Cell fusion
- Microencapsulation
- Macroencapsulation
- Recombinant DNA technology:
 - gene deletion
 - gene doubling
 - introducing a foreign gene
 - changing the position of a gene

Included methods:

- Traditional breeding
- Conjugation
- Fermentation
- Hybridization
- In vitro fertilization
- Tissue culture