Draft Guidance
Compost and Vermicompost in Organic Crop Production

1. Purpose

This guidance provides clarification on allowed practices for composition, production, and use of compost and vermicompost in organic crop production.

2. Scope

This guidance applies to all certified and exempt organic producers, accredited organic certification agents (ACAs), and input suppliers.

3. Background

Section 205.203(c) of the soil fertility and crop nutrient management practice standard sets forth the requirements for management and application of plant and animal materials. This section of the National Organic Program (NOP) regulations provides specific requirements for the use of compost and raw manure, but does not describe the full range of methods that may be used for compost production. The National Organic Standards Board (NOSB) convened two task forces that delivered comprehensive reports to the NOSB on compost (2002) and compost tea (2004). The NOSB then made a final recommendation on compost, compost tea, processed manure, and vermicompost in November, 2006.

A key provision of the NOP regulations regarding addition of organic matter is found at §205.203, which states:

> "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 of crops, soil, or water by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances."

Section 205.203 further states that animal and plant materials include three types of materials: raw manure, composted plant and animal materials, and uncomposted plant materials. Raw manure is restricted in use, and compost containing animal materials must be produced under certain conditions. The designated types of systems do not include common methods of composting such as in piles (rather than windrows) or include any reference to vermicompost. The NOP concurs with the NOSB that the examples provided in §205.203(c)(1-3) is not a finite list of acceptable plant and animal materials for use in organic production. Site-specific variation in feedstock materials, management practices, and production requirements dictate that organic producers exercise flexibility in managing plant and animal materials on their operations.

In July 2007, the NOP issued NOP 5006 - Processed Animal Manures. NOP 5006 clarifies the criteria for production of processed manure products that may be used without restriction in organic production. While the use of processed animal manures in organic production was clarified in the NOP 5006 – Processed Animal Manures, the use of vermicompost has not been addressed. Vermicompost is an alternative method to meeting the NOP compost requirements. Vermicomposts are organic matter of

plant and/or animal origin, consisting mainly of finely-divided earthworm castings, produced non-thermophilically with bio-oxidation and stabilization of the organic material, due to interactions between aerobic microorganisms and earthworms, as the material passes through the earthworm gut.

Feed stocks for vermicompost materials include organic matter of plant or animal origin, preferably thoroughly macerated and mixed before processing. Pathogenic organisms are eliminated in 7-60 days, depending on the technology used. Vermicomposting systems depend upon regular additions of thin layers of organic matter at 1-3 day intervals to maintain aerobicity and avoid temperature increases above 35 degrees C (95 degrees F) which will kill the earthworms. Methods of vermicomposting include outdoor windrows (6-12 months), angled wedge systems (2-4 months), indoor container systems (2-4 months) and continuous flow reactors (30-60 days).

Earthworms fragment the organic wastes into finely-divided materials with a low C:N ratio and high microbial activity. Nitrogen is mostly found in the nitrate form, and potassium and phosphorus are in soluble forms. For most organic wastes, no traces of the raw materials are visible. Processing is maintained at 70-90% moisture content with temperatures maintained in the range of 18-30 degrees C (65-86 degrees F) for good productivity.

4. Policy

Compost is allowed in accordance with §205.203(c)(2). An example of another acceptable composting method is when:

a. Compost is made from allowed feedstock materials (either nonsynthetic substances not prohibited at §205.602, or synthetics approved for use as plant or soil amendments), and
b. The compost pile is mixed or managed to ensure that all of the feedstock heats to the minimum of 131^{o} F (55^{o} C) for a minimum of three days. The monitoring of the above parameters must be documented in the Organic System Plan in accordance with §205.203(c) and submitted by the producer and verified during the site visit.

An example of acceptable vermicomposting is when:

a. It is made from allowed feedstock materials (either nonsynthetic substances not prohibited at §205.602, or synthetics approved for use as plant or soil amendments);
b. Aerobicity is maintained by regular additions of thin layers of organic matter at 1-3 day intervals;
c. Moisture is maintained at 70-90%; and
d. The duration of vermicomposting is at 6-12 months for outdoor windrows, 2-4 months for indoor container systems, 2-4 months for angled wedge systems, or 30- 60 days for continuous flow reactors.

5. Procedure

Compost and vermicompost productions practices should be described in the organic system plan (OSP). Compost production practices should include the type and source of all feedstock materials, temperature monitoring logs by date, and practices used to achieve uniform elevated temperatures. Vermicompost production practices should include the type and source of all feedstock materials, and practices used to achieve aerobicity and maintain adequate moisture. The ACA may allow the use of compost if they

review the OSP and records and are assured that these parameters are met. Certifiers reviewing compost inputs produced by commercial operators should similarly review the production methods and source materials.

Additional methods for documenting compliance may include measuring temperature, time, moisture content, chemical composition, biological activity, and particle size. These measurements may include testing feedstock materials and compost for one or more characteristics including initial and final carbon to nitrogen ratios, stability (using ammonia/nitrate ratio, O_2 demand, CO_2 respiration rate or other standard tests), pathogenic organisms or contaminants.

6. References

§205.203 Soil fertility and crop nutrient management practice standard.

(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 of crops, soil, or water by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances. Animal and plant materials include:

(1) Raw animal manure, which must be composted unless it is:
  (i) Applied to land used for a crop not intended for human consumption;
  (ii) Incorporated into the soil not less than 120 days prior to the harvest of a product whose edible portion has direct contact with the soil surface or soil particles; or
  (iii) Incorporated into the soil not less than 90 days prior to the harvest of a product whose edible portion does not have direct contact with the soil surface or soil particles;

(2) Composted plant and animal materials produced though a process that:
  (i) Established an initial C:N ratio of between 25:1 and 40:1; and
  (ii) Maintained a temperature of between 131 °F and 170 °F for 3 days using an in-vessel or static aerated pile system; or
  (iii) Maintained a temperature of between 131 °F and 170 °F for 15 days using a windrow composting system, during which period, the materials must be turned a minimum of five times.

(3) Uncomposted plant materials.

November 2006 Final NOSB Recommendation on Guidance: Use of Compost, Vermicompost, Processed Manure, and Compost Teas

Producers of any agricultural commodity or product certified as organic under the National Organic Program (NOP) must meet the fundamental requirements for processing and applying plant and animal materials for soil fertility and crop nutrient management practices as described in Section 205.203(c) of the final regulation. Examples of plant and animal materials are described in Section 205.203(c)(1-3). This recommendation denotes other materials and practices that would be acceptable under 205.203(c)(2) which applies to plant and/or animal material mixes.

1. Compost, in addition to that described in section 205.203(c)(2), is acceptable if: (i) made from only allowed feedstock materials; (ii) the compost pile is mixed or managed to ensure that all of the feedstock heats to the minimum of 131 °F (55 °C) for the minimum time (3 days). The

monitoring of the above parameters must be documented in the Organic System Plan submitted by the producer and verified during the site visit. An explanation of compliance with section 205. 203 (c) should also be presented in the plan.

2. Vermicompost is acceptable if (i) made from only allowed feedstock materials, (ii) aerobicity is maintained by regular additions of thin layers of organic matter at 1-3 day intervals, (iii) moisture is maintained at 70-90% and (iv) duration of vermicomposting is at least 12 months for outdoor windrows, 4 months for indoor container systems, 4 months for angled wedge systems, or 60 days for continuous flow reactors.

3. Processed manure materials must be made from manure that has been heated to a temperature in excess of 150 ° F (65 ° C) for one hour or more and dried to a moisture level of 12% or less, or an equivalent heating and drying process that produces a product that tests negative for pathogenic contamination by *Salmonella* and fecal coliform organisms. Since processed manures have been treated to reduce pathogenic organisms, applications are not subject to the restrictions placed on raw animal manure applications in §205.203(c)(1)(i, ii, iii). To prevent re-growth of pathogens in processed manures, post planting use on crops whose edible portion contacts the soil must be limited to below soil surface applications only.

4. Compost teas must be made with potable water. Equipment used to prepare compost tea must be sanitized before use with a sanitizing agent as defined by 21 CFR 178.1010, using allowed materials found on the National List. Compost tea must be made with compliant compost or vermicompost, using the NOSB recommendation for compost and vermicompost mentioned above, and as defined in section 205.203 (c) (2) of the NOP rule. For compost tea, this applies to 100% plant feedstock materials, in addition to manure feedstocks because non-manure compost feedstocks may harbor high levels of fecal bacteria.

Compost tea made without compost tea additives can be applied without restriction. Compost tea made with compost tea additives can be applied without restriction if the compost tea production system (same compost batch, additives, and equipment) has been pre-tested to produce compost tea that meets the EPA recommended recreational water quality guidelines for a bacterial indicator of fecal contamination (US EPA, 2000). These indicators and the passing criteria are Escherichia coli (126 CFU/100ml) or enterococci (33 CFU/100ml). At least two compost tea batches must be tested using accepted methodology (APHA-AWWA-WEF, 1999; US EPA, 2000), with the average population of indicator bacteria across compost tea batches used as the measurement of passing. Each new batch of compost would require that the system quality assurance pre-test be conducted again as indicated. After it passes again, compost tea from the system can be used without restriction, provided that an annual re-test is completed.

If compost tea made with compost tea additives has not been pre-tested for indicator bacteria, its use on food crops is restricted to the 90/120 day pre-harvest interval. Crops not intended for human consumption, ornamental plants, and grain crops intended for human consumption are exempt from bacterial testing and 90/120 day pre-harvest interval restrictions. Raw manure extracts or teas may be applied to the soil with a 90/120 day pre-harvest restriction. Foliar applications of raw manure extracts or teas are prohibited. Compost leachate may be applied to the soil with a 90/120 day pre-harvest restriction. Foliar applications of compost leachate are prohibited.

Compost extracts - resulting from any mixture of compost, water, additives, and adjuvants that are not held for more than one hour before use - may be applied without restriction. Compost tea or compost extracts are not allowed for the production of edible seed sprouts.

NOP 5006: Processed Animal Manures, July 16, 2007

NOP 5016: Allowance of Green Waste in Organic Production Systems, April 19, 2010