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## 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 National Organic Program (NOP) certifying agents, all certified and exempt organic producers, and input suppliers.

### 3. Background

The NOP regulation 7 CFR 205.203(c), 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 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.

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 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.

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 was clarified in *NOP 5006*, the use of vermicompost was not addressed in that guidance. Vermicompost is an alternative method for 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 aerobic conditions and avoid temperature increases above 35 degrees C (95 degrees F) which will kill the earthworms. Methods of vermicomposting include outdoor windrows (usually managed for 6-12 months), angled wedge systems (usually managed for 2-4 months), indoor container systems (usually managed for 2-4 months) and continuous flow reactors (usually managed for 30-60 days). For outdoor windrows, one indicator that the process is complete is when the worms move out of the compost, which would typically take 6 months in warm conditions, or up to 12 months in colder climates.

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**

### **4.1 General**

Compost and vermicompost production practices should be described in the operation's organic system plan (OSP). Certifying agents may allow the use of compost if they review the OSP and records and are assured that all requirements are met. Compost production records should include the type and source of all feedstock materials. When animal materials are used in compost production, the certified operation should maintain temperature monitoring logs, and document the practices used to achieve uniform elevated temperatures. Vermicompost production records should include the type and source of all feedstock materials. When animal materials are used to produce vermicompost, the certified operation should maintain a log of duration of vermicomposting with a description of the practices used to achieve aerobic conditions and maintain adequate moisture. Certifiers reviewing compost inputs produced by commercial operators should similarly review the production methods and source materials.

Certified operations can also demonstrate compliance with the compost requirements by measuring temperature, time, moisture content, chemical composition, and biological activity. These measurements may include testing feedstock materials and compost for one or more characteristics



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including initial and final carbon to nitrogen ratios, stability (using ammonia/nitrate ratio, O<sub>2</sub> demand, CO<sub>2</sub> respiration rate, or other standard tests), pathogenic organisms, or contaminants.

#### **4.2 Compost**

Compost containing plant and animal materials is allowed in accordance with § 205.203(c)(2). Other examples of acceptable composting methods include:

1. Compost that 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
2. The compost pile is mixed or managed to ensure that all of the feedstock heats to the minimum of 131° F (55° C) for a minimum of three days. The monitoring of the above parameters must be documented in the OSP in accordance with § 205.203(c) and verified during the site visit.

#### **4.3 Vermicompost**

Vermicomposting is an acceptable method of composting when:

1. 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);
2. Aerobic conditions are maintained by regular additions of layers of organic matter, turning, or employing forced air pipes such that moisture is maintained at 70-90%; and
3. The duration of vermicomposting is sufficient to produce a finished product that does not contribute to contamination of crops, soil, or water by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances.

#### **4.4 Permitted Uses**

Composts containing animal materials that do not meet the requirements at 4.1 and vermicomposts containing animal materials that do not meet the requirements at 4.2 of this policy may be permitted subject to restrictions of § 205.203(c)(1), similar to raw animal manure, provided all feedstocks are allowed materials (either nonsynthetic substances not prohibited at § 205.602, or synthetics approved for use as plant or soil amendments).

Compost and vermicompost made without animal materials as feedstock are not restricted in use, in accordance with the provision for uncomposted plant materials at § 205.203(c)(3), provided all feedstocks are allowed materials (either nonsynthetic substances not prohibited at § 205.602, or synthetics approved for use as plant or soil amendments).

### **5. References**

#### **NOP Regulations (as amended to date)**

7 CFR § 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:



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- (1) Raw animal manure, which must be composted unless it is...
  - (2) Composted plant and animal materials produced through a process that...
  - (3) Uncomposted plant materials.

7 CFR § 205.602 Nonsynthetic substances prohibited for use in organic crop production.

**NOSB Recommendations**

November 2006, [Final NOSB Recommendation on Guidance: Use of Compost, Vermicompost, Processed Manure, and Compost Teas.](#)

**NOP Program Handbook: Guidance and Instructions for Accredited Certifying Agents and Certified Operations**

NOP 5006: Processed Animal Manures. July 22, 2011.

Approved on July 22, 2011