

**National Organic Standards Board
Compost Task Force Recommendation
April 18, 2002**

INTRODUCTION

Section 205.203(c) of the soil fertility and crop nutrient management practice standard in the USDA standard sets forth the fundamental requirement for processing and applying plant and animal materials. The section 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". Subsequently, Section 205.203(c) states that plant and animal materials include raw animal manure (205.203(c)(1)), compost (205.203(c)(2)), and uncomposted plant materials (205.203(c)(3)). The USDA standard establishes that raw animal manure and uncomposted plant materials are distinct materials that, when combined and processed, yield compost. The standard also contains management restrictions for crops on which raw manure has been applied and specifies the conditions that must be maintained to process compost. Other than the common requirement that all production practices used in organic production must maintain or improve the natural resources of the operation, including soil and water quality, there are no processing or application restrictions or conditions for using composted or uncomposted plant materials that are not mixed with animal materials.

At its Washington, DC meeting in October 2001, the National Organic Standards Board (NOSB) reviewed the provisions in the USDA standard for processing and applying plant and animal materials. While supportive of the fundamental requirement established in Section 205.203(c), the NOSB expressed concern that the provisions in Section 205.203(c)(1)-(3) could excessively restrict the processing and application of beneficial plant and animal materials. The NOSB identified specific weaknesses in this part of the practice standard, including:

*The C:N ratio range for compost is too narrow. Quality compost can be made with C:N ratios from as low as 15:1 and up to 60:1.

*The requirement for turning compost in a windrow system five times is too prescriptive.

*The terms in-vessel, static aerated, windrow, and raw manure are not defined.

*Compost tea is not addressed

*Vermicompost products are not addressed

*Manures that have been heat treated to eliminate pathogenic organisms without composting are not addressed.

The NOSB concluded that the USDA standard should be clarified to accommodate a broader range of plant and animal materials and related processing practices than specified in Section 205.203(c)(1)-(3). The intent of the crop nutrient and soil fertility management practice standard should be to identify fundamental management parameters and to establish threshold requirements for complying with those parameters. 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. The NOSB established the Compost Task Force to clarify the parameters and requirements in the USDA standard for processing and applying plant and animal materials in organic crop production.

The Task Force concurs with the NOSB that many certified organic farmers use plant and animal materials that are not adequately defined or described in Section 205.203(c)(1) – (3). Examples of materials that are incompletely addressed in the USDA standard are compost and its liquid extract compost tea, vermiculture products, and processed manure products. The Task Force is especially concerned that many producers process compost by selecting and managing plant and animal materials differently than the specifications established in Section 205.203(c)(2)(i)-(iii). This recommendation provides producers and certifying agents with a more comprehensive description of the plant and animal materials allowed in organic crop production and the conditions under which they must be processed. Since it is impractical to describe every combination of plant and animal material and establish how it must be processed, this recommendation should serve as guidance for producers and certifying agents. Full compliance with the provisions of Section 205.203(c) must be documented in the producer's organic system plan.

The Task Force endorses the fundamental requirement in Section 205.203(c) that all plant and animal materials used in organic crop production must be managed 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”. The Task Force interprets the subsequent provision that “Animal and plant materials include” not to be restrictive but rather as allowing examples of such materials other than those specifically provided for in Section 205.203(c)(i)-(iii). This recommendation includes descriptions and conditions for four such allowed plant and animal materials: compost, compost tea, vermicompost products, and processed manures. The Task Force recommends that producers and certifying agents use the parameters established in Section 205.203(c) and the management practices outlined in this recommendation for specific plant and animal materials to evaluate compliance on a site-specific basis. The Task Force is not recommending changes to the practice standard provisions for processing or applying raw manure or uncomposted plant materials.

1. Compost

Definition:

Compost: Organic matter of plant and/or animal origin managed to promote aerobic decomposition and an increase in temperature to enhance its physical and nutritive properties as a soil amendment while minimizing pathogenic organisms. Compost must achieve a minimum temperature of at least 131°F (55 C) and remain there for a minimum of 3 days.

Producing compost that improves soil organic matter while not contributing to contamination of crops, soil, or water by plant nutrients, pathogenic and parasitic organisms, heavy metals or residues of prohibited substances requires careful management. The fundamental conditions for composting are: 1) Compost shall incorporate only allowed feedstock materials, except for incidental residues that will not lead to contamination; 2) Compost shall undergo an increase in temperature for a period of time to a level that minimizes pathogenic organisms; 3) Compost shall release H₂O and CO₂ with a resultant loss of volume and weight; 4) Compost shall undergo a decrease in carbon to nitrogen ratio and an increase in nutrient stability.

The primary feedstock materials for making compost are organic matter of plant and animal origin. The USDA standard defines organic matter as “the remains, residues, or waste products of any organism.” Organic matter of plant and animal origin includes crop residues, non-crop plant material such as leaves and food waste, and manure and other residues from animal bodies including soil invertebrates. Compost may be produced from a single material of plant or animal origin or from the combination of multiple materials. The producer may add a natural nonagricultural material or a synthetic material allowed in organic crop production to compost for a specific management purpose such as improved porosity. When sourcing feedstock materials, the producer must consider their origin and comply with the requirement to prevent contact between organically managed crops and prohibited substances.

Composting requires that the producer combine and manage feedstock materials to achieve a documented increase in temperature. Composting begins in the mesophilic range (50°F - 105°F) and moves into the thermophilic range (in excess of 105°F) as decomposing organic matter of plant and animal origin releases energy as heat. Compost must achieve a recognized minimum temperature of at least 131°F (55 C) and remain there for a minimum interval of 3 days to minimize pathogens and parasites. Compost piles must be turned or be managed in some other acceptable way to ensure that all of the feedstock heats to the minimum temperature. Composting materials must be passively or actively aerated by the design of the pile or through turning. Physical maturation of compost transforms the feedstock materials and little or no trace of their original nature is distinguishable upon completion. Particles in finished compost have been reduced in size and become consistent and soil like in their texture. After achieving a minimum temperature of 131°F for a minimum of 3 days, compost should cure in the mesophilic range for at least 45 days or until the producer can document that it is suitable for soil application. Compost maturity involves physical and chemical

components and must include an appraisal of potential antagonisms between the compost and plant or soil health such as excessive nutrients or salts.

A producer must document in their organic system plan all management provisions or practices related to the fundamental conditions for making compost: use of allowed feedstock materials, temperature elevation and maintenance, decreases in weight, volume, and carbon to nitrogen ratio, and increase in nutrient stability. The certifying agent must concur that the provisions in the organic system plan for making compost will fulfill the parameters for these conditions. Procedures for documenting compliance 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, O₂ demand, CO₂ rate or other standard tests), or pathogenic organisms.

2. Compost and Vermicompost teas

The use of a liquid compost extract, or “compost tea”, raises special issues. The preparation and use of compost tea and compost extract has been increasing in the U.S. during recent years. Organic producers especially are interested in compost teas and extracts because the preparations reportedly provide some degree of control of foliar and root pathogenic organisms. Various methods and practices have developed for production of the teas or extracts since the practice originated some years ago in Europe. However, recent research at the USDA Agricultural Research Service’s labs in Beltsville, MD and Corvallis, OR shows that certain approaches to compost tea or extract preparation are conducive to growth of enteric bacterial pathogenic organisms, such as enterotoxigenic E. coli and Salmonella. The practices and procedures that lead to pathogen growth in the prepared teas and extracts involve the addition of supplemental nutrients such as sugars, molasses or other readily available (soluble) carbon sources during batch production.

The researchers did not observed growth of enteric pathogenic organisms when compost tea or extract was prepared only with water and high quality compost. By high quality compost, they mean compost that has met criteria for destroying pathogenic organisms, i.e., 131°F for 3 days, or compost that has less than 3 MPN salmonella per 4 grams compost (dry weight) and less than 1000 MPN fecal coliforms. The critical determinant regarding pathogen growth in compost teas and extracts is the addition of the carbon sources like sugars, molasses, or yeast or malt extracts during the “brewing” phase.

Recommendation: Compost teas if used in contact with crops less than 120 days before harvest must be made from high quality compost described above and not prepared with addition of supplemental nutrients such as sugars, molasses or other readily available (soluble) carbon sources.

3. Vermicompost materials

Definition:

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

Vermicomposting, while not contributing to contamination of the environment by heavy metals, needs careful preparation and management of the organic wastes. Feed stocks for vermicompost materials include organic matter of plant or animal origin; either a single material or mixture, preferably thoroughly macerated and mixed before processing. Pathogenic organisms are eliminated in 7-60 days, depending on the technology used. All 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. Permitted methods and required duration 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, high microbial activity, nitrogen mostly in the nitrate form, and potassium and phosphorus in soluble forms. For most organic wastes, no traces of the raw materials are seen. Odors disappear within 48-72 hours of vermicomposting and the finished product should have an odor similar to soil. Processing must be maintained at 70-90% moisture content with temperatures maintained in the range of 18-30 degrees C (65-86 degrees F) for good productivity. This should be achieved by monitoring temperatures regularly to regulate timing of additions of wastes and adding moisture through fine sprays as required.

4. Processed manure materials

Manures that have been treated to reduce pathogenic organisms are considered to be "processed manure" materials. Processed manure materials must be made from manure that has been heated to a temperature in excess of 150°F for one hour or more, dried to a moisture level of 12% or less, or frozen. Since processed manure materials will not contribute to contamination of the soil by pathogenic organisms, they may be managed with many of the same requirements as compost. Like compost, processed manure materials do not have to be incorporated into the soil and therefore can be applied as a top-dress or side-dress. Similarly, there is no waiting period between application of processed manure materials and harvest of the crop. Unlike compost, however, these materials are highly soluble and have reduced biological activity. Therefore, they should not be used as a primary source of nutrients.

CONCLUSION

The Compost Task Force concurs with the NOSB that Sections 205.203(c)(1) – (3) of the USDA standard do not sufficiently define or describe a variety of beneficial soil amendments and fertilizers that have long been used in organic crop production. The Task Force endorses the fundamental requirement in Section 205.203(c) that all plant and animal materials used in organic crop production must be managed 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”. The Task Force supports amending the soil fertility and crop nutrient management practice standard by incorporating a comprehensive understanding of allowed materials and practices. 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. Pending amendment of the USDA standard, the Task Force recommends that producers and certifying agents adhere to the management practices contained in this report when using compost, compost tea, vermicompost materials, and processed manure materials in organic crop production.