

CHECKLIST
ORGANIC WASTE MANAGEMENT - COMPOSTING

- ✓ Follow all state and local regulations regarding composting. Contact Massachusetts Department of Agricultural Resources Composting Program for more information (<http://www.mass.gov/agr/programs/compost/index.htm>).
- ✓ Most organic waste materials generated by a nursery or landscaping service can be composted.
- ✓ Avoid composting grass clippings that has been treated with herbicides.
- ✓ Compost piles should always be distant and downwind from sensitive neighbors and not sited close to residential property.
- ✓ Piles should be protected from surface water and storm water runoff.
- ✓ Proportions of carbon to nitrogen are critical to successful composting. The materials being composted will determine the exact recipe for any given operation. Materials with high carbon to nitrogen ratios, such as 100:1, should be balanced with materials having low carbon to nitrogen ratios, e.g. 15:1.
- ✓ Pile structure is important because the air needed for composting comes from passive air flow through the pile, not from turning.
- ✓ Regular turning of the pile will mix the nutrients and re-establish pile structure.
- ✓ Moisture content can be adjusted during turning.
- ✓ After the compost has gone through several heating and cooling cycles and the original waste has decomposed, the compost process should slowly finish in a curing pile.
- ✓ Activities that tend to release odors should be scheduled to minimize negative impacts.
- ✓ Avoid dealing with odorous compost on weekends, holidays, and evenings.
- ✓ Consider wind conditions before opening compost piles.
- ✓ Stronger winds can disperse odors but also create dust concerns. Care should be taken to control dust when grinding and turning piles.
- ✓ Most odor problems can be avoided, controlled, or minimized by keeping the compost pile aerobic, porous, well aerated, and well mixed. Odor problems are most likely when anaerobic decomposition is occurring.

ORGANIC WASTE MANAGEMENT

Aerobic Composting

Composting is the managed process of breaking down organic material. The composting process involves microorganisms feeding on organic material and consuming oxygen. The process generates heat, drives off moisture, and reduces bulky organic waste into a beneficial soil-like material containing nutrients, humus and microorganisms in just a few months. Material in an unmanaged pile of organic debris will eventually break down but the process will take a long time and may result in odor or other nuisance problems due to poor aeration.



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Regulations

Agricultural waste composting, including the processing of compostables are exempt from Massachusetts Department of Environmental Protection solid waste site assignments provided the operation incorporates good management practices and as long as the operation is registered and complies with the policies of the Massachusetts Department of Agricultural Resources. For more information contact the Massachusetts Department of Environmental Protection at (617) 292-5500 or the Massachusetts Department of Agricultural Resources at (617) 626-1700.

The Massachusetts Department of Agriculture Resources may register agricultural composting operations if the Department determines that:

- 1) the compost operation is located on agricultural unit;
- 2) the applicant has submitted a completed application;
- 3) the applicant agrees to a site visit; and
- 4) the applicant demonstrates knowledge and capability to conduct the agricultural composting operation to produce a stabilized compost product.

Agricultural Waste Composting

A composting operation for agricultural wastes, when located on a farm engaged in “agriculture” or “farming” as defined in M.G.L. c. 128, § 1A. Such composting operation may, in addition to agricultural wastes, utilize the following compostable materials, provided the operation is registered and complies with policies of the Department of Food and Agriculture:

1. leaf and yard waste;
2. wood wastes;
3. clean newspaper or cardboard;
4. clean, compostable (i.e. thin) shells, and clean bones;
5. non-agricultural sources of manures and animal bedding materials;
6. less than 20 cubic yards or less than 10 tons per day of vegetative material; and
7. less than 10 cubic yards or less than 5 tons per day of food material.

Composting methods should be chosen based on site conditions, types of available raw materials and equipment available to create aerobic composting conditions.

What to Compost

Most organic waste materials generated by a nursery or landscaping service can be composted. Large material will need to be shredded before it is added to a carefully-constructed compost pile. Some material may begin to decompose in a storage pile but full composting will not occur until the material is mixed and managed in the correct proportions of carbon to nitrogen (C:N ratio), with adequate airflow and moisture.

Composting is an excellent method of recycling grass clippings. However, do not compost grass clippings or any other plant residues that have been treated with herbicides. If carried out properly, it can reduce the potential weed seeds and diseases from being reintroduced into the fields. The finished compost is a stable organic material which is a useful soil conditioner or nutrient source. Due to the characteristics of fresh grass clippings (high-moisture, high-nitrogen content and small particle size), co-composting with a high-carbon bulking agent is essential.

Acceptable Materials For Composting

Green and woody plants
Clippings and trimmings
Soil and planting media
Untreated wood and uncoated paper scraps

Unacceptable Materials For Composting

Chemically treated wood products
Plastic, e.g. pots, bags, and sheet film

Unprocessed sod and chunks of soil
Large and bulky items, e.g. stumps, pallets, concrete, and asphalt

Site Selection for Compost Piles

Available sites should be analyzed for conditions potentially detrimental to production and access. There needs to be enough space to store and process waste, operate and turn active windrows or piles, and store and cure finished compost. A facility that is short on space will eventually experience problems. Composting can have off-site impacts. Compost piles should always be distant and downwind from sensitive neighbors and not sited close to residential property.

Composting can also create water quality problems. Piles should be protected from surface water and storm water runoff. Piles may need to be protected from rain. This is because a compost pile can get saturated, stop working and, become anaerobic. This will create odor problems. Saturated piles will need to be remixed and rebuilt. Runoff from an active compost pile or stored compost can also create water pollution problems. Standing water can cause odor problems. Compost piles should always be sited so that runoff is minimized. Any runoff should be collected and used rather than allowed to leave the property.

- State and Local regulations regarding composting facilities should be thoroughly investigated. Contact Massachusetts Department of Agricultural Resources Composting Program for more information (<http://www.mass.gov/agr/programs/compost/index.htm>).
- Compost piles should always be distant and downwind from sensitive neighbors and not sited close to residential property.
- Piles should be protected from surface water and storm water runoff.

The Composting Process:

Pre-compost Preparation

Materials intended as components for compost may need to be ground before composting to increase the surface area allowing more rapid decomposition.

Bulking agents or amendments may be needed to improve porosity in a mix.

Finished composts may need grinding or screening to accommodate the end use.

Mixing

Compost components must be thoroughly mixed to allow proper combination of carbonaceous and nitrogenous elements.

Proportions of carbon to nitrogen are critical to successful composting. The materials being composted will determine the exact recipe for any given operation. Materials with high C:N ratios, such as 100:1, should be balanced with materials having low C:N ratios, e.g. 15:1.

Pile Construction

Pile construction is dependent on the types of materials being composted, the method of turning and the composting site. Generally, piles should be broad across the base with sloping sides and

flat tops. Several smaller piles will work easier than one large pile.

When piles are too large or lose their structure, they can become anaerobic in the center and cause odors when opened.

Monitoring

Compost must be carefully monitored to measure moisture and oxygen content and temperature during the active composting process and the curing process. Temperature and air flow must be managed for composting to work effectively. If these elements are not controlled, the composting process may slow down and offensive odors could be released when the pile is disturbed. Since the microorganisms that decompose organic waste generate heat, a new compost pile will heat up to about 130 °F and then start to cool as available nutrients, moisture or oxygen are depleted. Active composting occurs between 105 and 145 °F. The pile will also settle as decomposition takes place. Regular turning of the pile will mix the nutrients and re-establish pile structure.

Moisture

Moisture content can be adjusted during turning. The material in windrows and static piles will stop composting when the moisture level is too low. If the moisture level is too high or the air flow is blocked, the pile may go anaerobic and generate offensive odors.

Turning

In windrow systems, turning the windrows or piles insures aeration and moisture distribution and allows the entire mass time in the center of the pile where the thermophilic organisms are most active.

Frequency of turning depends on the materials being composted, whether they are in a structure or exposed to the elements and climate. Generally, windrows should be turned as often as is practical once pile temperature exceeds 100 °F.

Curing

Compost cures at lower temperatures, below 105 °F, and allows the compost to stabilize. This step is vital to product consistency and usability.

Finished compost should be tested for the following characteristics: moisture content, pH, organic matter, C:N ratio, soluble salts, total nitrogen, nitrate, ammonium, extractable heavy metals (lead, cadmium, nickel and chromium) and extractable major and minor nutrients (phosphorus, potassium, calcium, magnesium, zinc, boron, iron, manganese and copper).

Uncured compost can be detrimental to plants.

Runoff Controls

Composting can produce leachate with high levels of nitrogen and other groundwater contaminants. Systems must be provided to account for this possibility.

Types of Compost Piles

There are several types of compost piles. The **Windrow** consists of long rows 6 to 20 feet wide and 4 to 12 feet high. Rows are managed based on process time and temperature of the pile. Windrow turning equipment is available but not required. Total compost and curing time is five to ten months without turning. Turning will speed the process by three to five months. This type does not require a special facility; the pile can be constructed and managed with a front loader. Composting time is fast, most composting conditions can be controlled, and more than one pile is possible.

Static Pile consists of a single pile with passive aeration and may be left unturned during the whole the composting process. Piles can cause odors when they become anaerobic in the center. There is a long composting time and uneven composting can occur within pile. Composting conditions can not be controlled.

The **Aerated Pile Windrow** consists of air that is blown or sucked through in windrow or static piles. Blowers are controlled by time or the temperature of the piles. Total compost and curing time is shorter than other methods at one to two months; however, it requires air blowers, piping, power utilities, and may require a concrete base slab. Piles are difficult to construct and removal requires careful operation. Composting can be uneven.

In-Vessel consists of material that is composted inside a structure like a concrete bunker, or inside a vessel tank or drum. The container provides greater control of composting conditions.

Odor Control

Odor is the most common complaint from the public. Most odor problems can be avoided, controlled, or minimized by keeping the compost pile aerobic, porous, and well mixed.

Attention to pile structure and frequent turning will deter most odor problems. Since all composting activities will generate some odor, good management should include placing the compost pile downwind from neighbors as far as possible. Activities that tend to release odors should be scheduled to minimize negative impacts. Avoid dealing with odorous compost on weekends, holidays, and evenings. Odor will carry in moist, still air or on a gentle breeze, so consider wind conditions before opening compost piles. Stronger winds can disperse odors but also create dust concerns. Care should be taken to control dust when grinding and turning piles. If necessary, persistent odors can be filtered, treated, or masked with perfumes.