Massachusetts Department of Environmental Protection
Bureau of Waste Prevention

Guidelines for Centralized Grass Composting

Background

A DEP funded pilot study was conducted in Yarmouth, Massachusetts to develop best management practices for composting grass collected in large quantities by municipalities. The three year project also examined the effects of composting grass in terms of odors, impacts on soils, and groundwater. Based on the findings of this pilot study, the following guidelines were developed. Due to the varying nature of the many composting sites throughout Massachusetts, and the varying amounts of leaves and grass being composted, these recommendations are to be used as a guide. All grass composting operations should be carefully developed and monitored to prevent odors and other potential adverse environmental effects.

The principles for composting are universal. For more details of the process, refer to DEP's "Leaf and Yard Waste Guidance Document". If additional technical assistance is required, contact the DEP composting staff at (617) 292-5960.

Key Research Findings

The observations listed below are the results of the Yarmouth study. DEP Guidelines are based on the following findings:

1. For safe and practical handling of grass, the most important single factor is the proper mix ratio. In general, a maximum of 1 part grass to 3 parts leaves by volume is the recommended mix. A good mixing technique is important to attain this ratio. If leaves are not available, another carbonaceous material such as wood chips can be used.

2. The addition of grass to leaf windrows accelerates the breakdown time of the leaves, and shortens overall composting time.

3. Pesticides were found in low concentrations in raw materials, but none were detected in the finished compost sampled from the same material. Most pesticides that are legally used for lawns and gardens have been shown to degrade in the composting process.

4. Excess nitrogen can result in the formation of nitrates. Nitrogen is contained in higher concentrations in grass than in leaves and is converted into nitrate, a soluble form, by the aerobic composting and curing process. Nitrate is a valuable nutrient which can also be a pollutant in sufficient quantities. Potential nitrate leaching can be prevented through proper site design and compost management.

5. Higher levels of nitrates are formed during the mesophilic (low temperature) and curing stages than during the thermophilic (high temperature) stage of active composting. Proper management of

curing piles, which will be described later, mitigates potential leaching of nutrients.

6. If composting on sandy soils, especially where there is a relatively high water table, it is important not to compost a higher ratio of grass to leaves than 1 to 3. Leaching of nitrate and nutrients could potentially affect the soil or water table. (Soils rich in organic matter can, to some extent, buffer nutrients from leaching into ground water). On sensitive sites, it is advisable not to compost grass on the same portion of the site continually. Nitrate loading is cumulative, and could impact the subsoil or groundwater over long periods of time. Shift windrow positions every two or three years.

7. Odors can be kept at a minimum on both small and large sites with good management practices.

GRASS COLLECTION AND COMPOSTING

COLLECTING GRASS

1. Bag Collection

⇒ Grass collected in plastic or paper bags must be debagged as soon as possible after arrival. If grass is allowed to remain in bags for more than two days, the grass may become anaerobic and generate strong odors when the bags are opened. This creates an unpleasant job for the debaggers and could cause an odor release to the immediate area. Collection in plastic bags is discouraged given the additional labor requirements involved in debagging.

⇒ Sites located in sensitive areas (close to residences, schools etc.), and sites processing large quantities of grass should take extra care while debagging. Bagged grass that is more than several days old should not be opened all at once but rather opened a few bags at a time. The more that are opened at one time, the stronger the odor will be.

⇒ Grass collected in paper bags should be shredded or broken open before composting. If grass remains in the bag, anaerobic pockets will form, which may result in odors. Shredding, slashing, wetting and turning with the loader are methods for releasing the grass from paper bags. Once removed, the grass should be well blended with the leaves. If bags are mixed into a hot composting windrow of leaves in a very low ratio (i.e., 1:10), bag breakdown can occur with minimal odors.

⇒ A possible danger from grass collected in paper bags is spontaneous combustion. This condition requires a moisture level less than 40% and temperatures in excess of 450? F. If the windrow has dry pockets, fire is a possibility. To avoid this, split bags and spread grass, making sure the interior of the windrow is of a high enough moisture content (45-50%).

2. Bulk Collection

⇒ Grass collected at a drop-off site or in bulk by landscapers or municipal employees should be

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mixed in with leaves (or wood chips) as quickly after arrival as possible. Grass left in a large heap will begin to decompose anaerobically very quickly, creating a slimy mass. It will emit strong odors when disturbed and will be difficult to blend with leaves.

⇒ To control labor costs, limit residents' drop-off period to one or two days a week and charge for landscapers during the week.

⇒ The amount of grass received and the method used to handle the grass will impact the labor and equipment time required. Plan in advance, and use the method that best suits your ability. **It is essential that grass is handled properly (sufficient blending and turning) and in a timely fashion to avoid odor and nitrate problems.**

⇒ As with leaves, grass should be monitored for physical contaminants such as cans, bottles etc. upon arrival. Landscapers and residents should be informed of the procedure for delivering grass to the site (or curbside). They should be instructed to deliver grass and yard waste only, with no brush or trash mixed in.

⇒ Drop off areas should be monitored and improper materials removed, since contaminants left at the site may encourage others to do the same.

COMPOSTING GRASS

1. Mixing Ratio of Grass to Leaves

⇒ Keep mix ratios of grass to leaves low. To avoid odors and potential leaching of nitrates from grass, mix leaves to grass in a ratio of at least 3 parts leaves to 1 part grass. The higher the proportion of leaves to grass, the lower the potential for problems.

⇒ The nature of the site will determine the amount of grass to be added to a windrow. If the site is close enough to impact neighbors, high ground water, surface waters or wetlands, the proportion of leaves to grass should be at least 4 parts leaves to 1 part grass.

⇒ A higher ratio of grass to leaves will require better mixing and may require turning as frequently as daily in the first few weeks of composting in order to keep the oxygen at an adequate level.

⇒ Chipped brush may be used instead of, or in addition to, leaves. If chips are selected, screening may be necessary to remove undecomposed woodchips from finished compost.

2. Mixing Procedures

⇒ Blend grass with leaves as thoroughly as possible in initial mixing. It is important to make sure that grass isn't mixed in with the leaves in large clumps. If grass is not properly blended, there may be pockets of anaerobic grass breaking down which will cause odor and

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potential nitrate problems.

There are several factors to consider when adding grass to an existing windrow:

⇒ If the interior of the windrow is dry, thoroughly mix in grass. The high moisture content of grass will provide needed moisture to the windrow;

⇒ If the interior of the windrow is at the correct moisture content, or is on the wet side, spread the new grass thinly on top of the windrow and let the sun dry it out. Then mix the dry grass in with the leaves.

There are several methods of measuring out the proper mix ratios:

⇒ Build a new windrow as grass comes on site. Take three bucket scoops of leaves and spread them on ground adjacent to the windrow. Take one scoop of grass and mix well with the leaves, and re-pile the windrow. Build a new windrow in this fashion as the grass comes in;

⇒ Another method is to spread the grass in a 3-4" layer on the surface of an existing leaf windrow and let it dry. Then mix it in. Calculate the approximate volume of leaves, and keep records of the amount of grass added to the windrow. In this way, you may keep adding grass to the windrow on a weekly basis until you reach 1:3 parts grass to leaves by volume. An approximation will do.

3. Odor Control

⇒ If the compost site is close to houses, schools, and other public locations, it may be prudent not to accept large quantities of grass clippings for composting there, given potential odor conditions that can occur. By following the recommended management procedures in this guidance, odor problems may be minimized. Key strategies include:

- Do not let bags or piles of fresh grass accumulate at the site; debag and mix in as it arrives
- If you are debagging decomposed grass, do a little at a time to reduce the concentration of strong odors
- Debag on rainy days or when the wind is blowing away from the sensitive areas
- A complete initial mixing and blending is critical
- Frequent turning will facilitate mixing and rapid decomposition and neutralize odor

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producing compounds

- Other methods, such as forced aerated static pile and in-vessel or passive systems, may be appropriate in some circumstances

4. Monitoring

⇒ When composting grass with leaves, greater care should be taken to monitor temperatures. Grass is high in nitrogen and generates higher temperatures than leaves as it decomposes. This could raise the temperature high enough to kill off the microbial population in the windrow. A loss of composting time will result, because it will take a period of time for the microbes to repopulate the windrow and continue their work.

⇒ If the compost windrow reaches temperatures above 150 degrees, the pile should be turned and aerated. Turning will cool it down.

⇒ Moisture should be monitored (such as by hand squeeze test), and maintained at roughly 50%-60%. Dry windrows will severely limit decomposition and excessive moisture will inhibit decomposition and generate odors.

5. Compost Stabilization

⇒ The addition of grass accelerates the decomposition of leaves. Testing for stabilization of composted material is the same as if grass is not added. Compost stability is indicated when the material looks like soil rather than leaves or grass, and when it is turned and doesn't reheat (even with adequate moisture). Another test is to take a sample of compost, wet it and put it in a plastic bag and place it out in the sun for one or two days. If a strong odor is given off when the bag is opened and the compost is hot, it's an indication that the material is not yet stable. Woody materials such as chips or sawdust are more resistant to decomposition and take a longer time to stabilize than leaves and green wastes.

6. Curing

⇒ Curing the material after composting facilitates the completion of the decomposition of yard waste into a stable nutrient-rich soil amendment. During curing, nitrogen in the immature compost is converted into nitrate, the form that is most readily utilized by plants as a nutrient.

⇒ Curing piles should not be in an area with a high water table and sandy soils. If this type of area is unavoidable, consider curing on a paved surface or on top of plastic or some other impervious material.

⇒ In any area, a good precaution is to cover the curing pile so that heavy precipitation will not cause leaching. Covering will also prevent weed seeds from being blown into the pile.

⇒ If you are analyzing the compost product, test for N P K as well as contaminants. The finished product will generally have a higher nutrient value than compost made from only leaves.

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7. Composting Grass with Newspapers

⇒ Newspaper is a potential bulking material and carbon source for grass clippings if you cannot otherwise recycle newspaper and do not have enough leaves. **There are several factors that must be considered before you pursue this option.**

- First you need a source of clean newsprint. Exclude magazines or colored print materials, which may contain heavy metals that can contaminate the finished compost.

- Other materials (contaminants) are sometimes collected with newspapers. They must be removed.

- Newspapers must first be shredded in order to be composted. Therefore, unless it's received shredded, a tub grinder or some type of shredding device is required.

- When mixing grass with newspaper, additional water will be required to both wet the paper to keep it from blowing, and to provide enough moisture to support the composting process.

- Windrows will have to be turned frequently because grass decomposes quickly, and the newspaper will mat. Initial turning can be several days after windrow formation. Monitoring temperature and visually inspecting the density of the windrow will indicate turning frequency.

- Final material will probably be rather coarse and, unless it cures for many months, screening will be necessary depending on end-use.

- Laboratory analysis of the finished material is recommended to check for potential contaminants.

SOURCE REDUCTION OF GRASS CLIPPINGS

"Don't Trash Grass" Public Education Program

An alternative to municipal composting of grass clippings is to promote a "Don't Trash Grass" program in your municipality. This is a public education program designed to encourage residents to keep grass clippings out of the waste stream by leaving them on their lawns, thereby eliminating the cost and labor associated with municipal collection and composting. At the same time, they are improving the health of their lawns by recycling the nitrogen in the clippings directly back into the soil.

Mass. DEP, in conjunction with Connecticut DEP and the U.S.

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EPA, has developed a package of public education materials which may be used to promote a "Don't Trash Grass" program in your community. The materials include a 12-minute video program, brochure, community action handbook, radio public service announcement, advertising slicks and logos. These materials are available free of charge by calling the Composting Program at (617) 292-5834.

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