CORNELL WASTE MANAGEMENT INSTITUTE

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YARD WASTE COMPOSTING

Yard waste is a substantial portion of the waste stream. It includes leaves, brush, grass clippings and other organic materials. Municipal yard waste composting has emerged as an attractive alternative to other waste disposal techniques such as waste to energy facilities or state-of-the-art landfills. It is both low in cost and easy to manage. In addition, composting produces a useful product which can be recycled. The decomposed yard waste can be sold as finished compost, given away, or used in place of purchased peat, topsoil, mulches, or other soil amendments.

A composting program may take a year or more to plan, procure a site, permit, and implement. Whether your municipality is composting yard waste or municipal waste and sludge, you should contact your regional Department of Environmental Conservation Office for advice and assistance with permitting.

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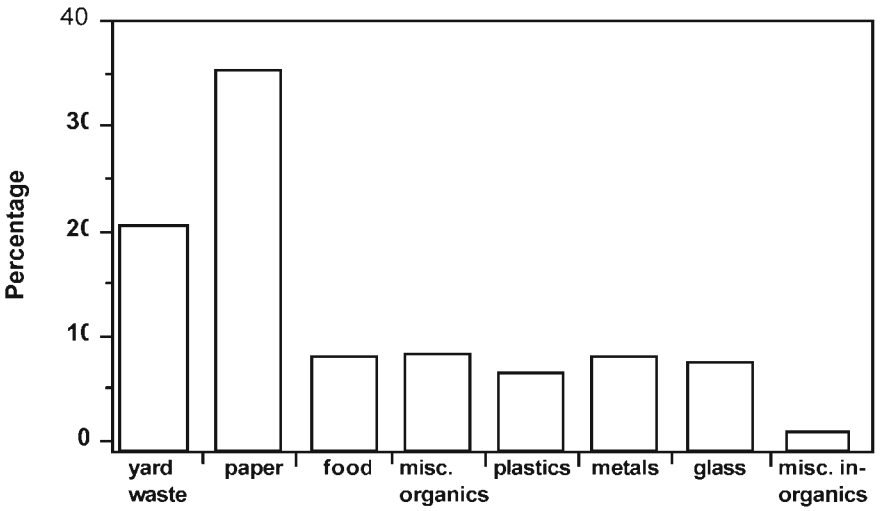

Source: Franklin Associates

WHAT PERCENTAGE OF SOLID WASTE IS YARD WASTE?

Estimates vary, of course, depending on the size of the community, whether it is a suburban, rural, or urban community, and such factors as number of mature trees and average lawn size. The weight and volume of yard waste also will vary seasonally. In general, yard waste comprises about 20% of the waste stream — a significant amount that can be diverted from our declining landfill space. Diverting yard waste from incineration is beneficial, too, since wet leaves negatively affect the efficiency and completeness of the combustion process. **Yard waste composting is not the complete answer to our waste management problem, to be sure, but when used judiciously with other alternatives it can be an important part of the solution.**

SUMMER, FALL, WINTER, SPRING — CAN YOU COMPOST YEAR-ROUND?

Leaves are the easiest yard waste to compost and account for most of the yard wastes generated in the fall. They take one year to fully decompose, although if turned frequently or mixed with high nitrogen content material, the decomposition rate can be accelerated.

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Grass clippings and garden wastes are common during the spring and summer. Fresh grass clippings require special attention because they are high in nitrogen and begin to decompose almost immediately. Complete composting occurs in four to six weeks. Grass clippings require frequent turning to avoid odor problems, initially as often as twice a day. Blending grass with leaves or chipped brush can slow decomposition to a more manageable level.

Christmas trees and woody debris are high in carbon and lignins which slow decomposition. Many communities have shredding or chipping programs using Christmas trees. The chips can be used as mulch or sold as fuel for wood-energy facilities. Generally, chips should not be mixed with yard wastes unless a coarse and chunky compost is desired.

COMPOSTING METHODS

There are three classes of technology used to compost yard waste.

Turned windrows is the most common method for rapid composting. A windrow is an elongated pile that can be several hundred feet in length. Mixing and aeration are accomplished by mechanically turning the windrow. Turning frequency is the major means of process control in windrow composting for producing a more uniform quality compost in less time. Finished compost can be made in as little as three months to as much as two years depending on the type of waste and temperatures, as well as turning frequency. Pre-shredding leaves can accelerate composting and may be necessary where a large amount of waste needs to be processed on a small site.

Forced Aeration (aerated static pile method) accomplishes decomposition by a network of perforated plastic pipes under the pile through which air is blown. This is a more expensive process than a mechanically turned windrow. It is most commonly used for composting sludge or food processing wastes where aeration and temperature control are crucial. Forced aeration requires a bulking agent to balance the carbon to nitrogen ratios, absorb moisture and increase the porosity for aeration. Yard waste may be a cost effective substitute for standard bulking agents such as sawdust or wood chips. For a community considering co-composting yard waste with sludge, a forced aeration system can be an economical way to handle the combined wastes.

In-vessel systems take raw wastes and place them in a complete indoor system with built-in aeration and mechanical mixing equipment. This offers protection from severe weather and better odor control than other methods. However, this system is expensive to build and operate. Because of the cost involved ($40 to $150 per wet ton of waste), this method is best used for programs that compost yard waste with sludge, food processing waste, mixed solid waste or other difficult to manage materials.

HOW DO I DETERMINE THE WEIGHT AND VOLUME OF YARD WASTE?

The weight and volume, as well as seasonality, of yard waste must be determined for planning a proper site design and capacity.

Weight to volume conversion factors are necessary to determine the capacity and design of the processing site. The density varies with the waste source by moisture content, texture, particle size and degree of compaction. Some general guidelines are provided in the table below.

Density of Yard Wastes

Material	Condition	Typical Density (lbs/cuyd)
Brush and dry leaves	loose and dry	100
Leaves	loose and dry	200-260
Leaves	shredded and dry	250-450
Green grass	compacted	500-1100
Green grass	loose and moist	350-500
Yard waste	as collected	350-930
Yard waste	shredded	450-600

COLLECTION OF YARD WASTE REQUIRES CAREFUL PLANNING

Municipal yard waste can be collected by separate curbside collection programs or at drop-off sites. Curbside systems are generally more expensive but may have significantly higher participation rates.

With curbside collection, provision must be made for keeping the yard waste separate from municipal solid waste. Trailers, compartments, and separate yard waste collection are all options which have been successfully used. Leaves, brush and grass clippings can be collected. Since these are different materials, it may be necessary to apply a different collection strategy for each. Leaves, for example, can be either bagged or loose, and can be picked up by a variety of different collection vehicles. If bagged, standard plastic, degradable plastic bags or paper bags can be used. Each requires different handling. Debagging tends to be a fairly expensive process. On the other hand, using degradable bags can eliminate debagging, but the bags can collect in the windrow turning machines and may need to be cut away. Bulk collection by vacuum trucks of loose leaves avoids these problems, but it is a slower process and operators must check for contaminants that may have been collected with the leaves.

IS COMPOSTING REALLY A COST-EFFECTIVE OPTION?

Composting use to be an expensive method of disposal. However, with the increasing cost of building and monitoring landfills or incinerators, composting is now a competitive option. A rough estimate of costs would be $5-30 per cubic yard of waste for outdoor systems to $75-$300 per ton for sophisticated in-vessel composting of municipal sludge. Composting facility siting may be less problematic and less costly than siting waste to energy facilities or landfills. In addition, composting produces an end product that can be sold or used in municipal parks, construction projects, or schools in place of peat which would have to be purchased for municipal landscaping projects.

WHAT CRITERIA ARE USED IN SITING MUNICIPAL COMPOSTING FACILITIES?

The following criteria are suggested for siting composting facilities: vacant land, flat (1-8% slope), open field (except for buffer area), sufficient size (about 3000 cu yd leaves/acre when using low-level technology), remote from residential area, no wetlands, no flood plains, no historic sites, no rare or endangered species, good access for trucks, no restrictions limiting leaf composting, no drainage problems, no high water table (> 2 feet), visual buffer between compost and public areas), and availability of adequate water for leaf wetting.

Size of Windrow Composting Sites

Town Pop.	Sq. Mi.	Street Miles	Site Size Acres
28,000	10	125	101/2
15,000	6	120	18
19,000	6.5	90	41/2
25,000	4	60	2
15,000	4.5	60	4

A COMPREHENSIVE RECYCLING PROGRAM HELPS PRODUCE QUALITY COMPOST

To produce a safe and marketable compost product, the plastic, glass, metal, rubber, and most important, household and commercial hazardous wastes have to be separated from the degradable waste. Large chunks of metal, glass and plastic will be obvious to the consumer and make the product unmarketable. The earlier in the process this separation occurs, the lower the levels of metals and contaminants found in the finished product. Combining yard waste composting programs with recycling is an excellent way to ensure a safe, marketable product.

WHAT ABOUT PERMITS?

Composting is subject to review and permitting by the New York State Department of Environmental Conservation, under NYCRR Part 360 Solid Waste Management Facilities Regulations, effective December 31, 1988. Restrictions apply to waste composting facilities that handle 3,000 or more cubic yards per year. The permit application sets forth operating conditions and setback requirements for both yard waste composting as well as sludge and waste composting. Regardless of the size, however, written notice must be provided to the regional DEC office providing information about the location, operation and intended end use for the compost. Contact the Regional DEC office early in your planning to ascertain the appropriate permit required for your composting plan.

Information in this Fact Sheet has been excerpted from: "Yard Waste Composting: A Planning Guide for Westchester County," Draft Report, prepared by Nancy Dickson and Thomas L. Richard, "Municipal Solid Waste Composting: A Simple Solution?" by Thomas Richard and "Criteria for Siting Municipal Leaf Composting Facilities," Solid Waste Management Newsletter, Volume XII, Nov. 1988, Rutgers University.

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