

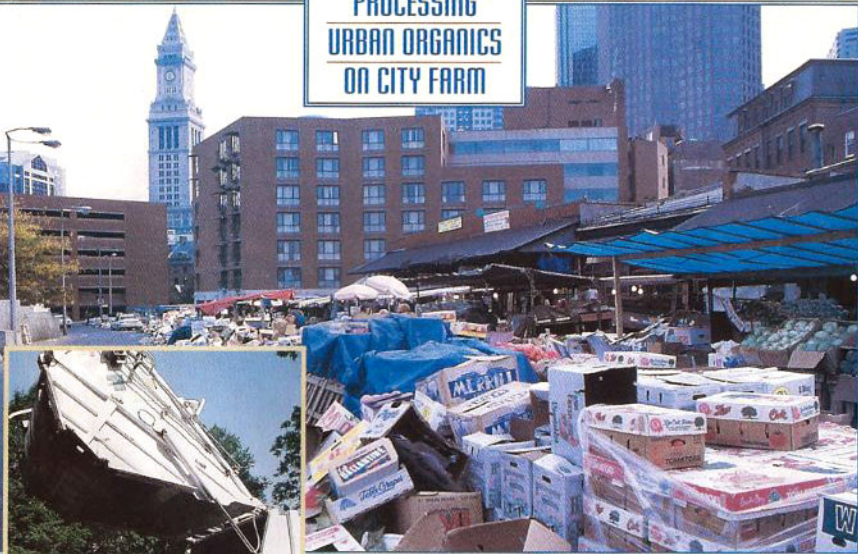
ANNUAL SURVEY: BIOSOLIDS COMPOSTING FACILITIES

BIOCYCLE

JOURNAL OF COMPOSTING & RECYCLING

DECEMBER 1994

PROCESSING
URBAN ORGANICS
ON CITY FARM



**California
Farm
Composting
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**Year End
Review Of
Recycling**

**New Systems
For In-Vessel
Composting**

**Major
Expansion
In Commercial
Recycling**



ORGANICS MANAGEMENT STRATEGY

AGRICULTURAL COMPOSTING IN BOSTON

The Allandale Farm project demonstrates that urban organics can be effectively composted on agricultural sites within city limits, and returned to productive local use.

*Bruce Fulford and
Brooke Nash*

Pushcart vendors at Boston's Haymarket (top) generate over 40 tons of organic residuals per week. Sumner Martinson of the Massachusetts DEP (center), along with other state and city officials, was instrumental in organizing collection and composting logistics.



IN MOST metropolitan centers of the United States, little of the organic matter, nutrient value or economic potential inherent in the management of organic resources in the solid waste stream is recovered for productive use within the city. In Boston, organic materials comprise a substantial percentage of the city's solid waste, and the majority of these materials can be recovered at far less cost than inorganic recyclables. Municipal collection of Boston's leaves alone is estimated at more than 10,000 tons annually, but at present only about one-tenth of that is being composted at the city's composting site.

There is sufficient land to compost these materials within or very close to Boston if progressive strategies are utilized in siting and managing the composting operations. Any new uses of these sites are more likely to be welcomed if the host community benefits from them. Whether on private or public land, new composting facilities must bring tangible improvements to the neighborhoods in which they are located, including involvement in the creation and management of public open space. The implementation of a successful organic materials recovery program depends on a good site selection process and active involvement with the host community in design and management.

While conceptually desirable, the task of siting a composting facility in the Boston area has been made more difficult by a recent series of notable and high profile failures of composting operations in eastern Massachusetts. In the past two years, several large private facilities and one municipally

owned site within 20 miles of Boston have produced vocal opposition due to olfactory assaults on the host neighborhood. These sites had succeeded in collecting large volumes of material, but mismanagement produced significant off-site odor problems. The two largest ones were forced to stop accepting new material and have required costly mitigation measures.

The successful implementation of moderately sized but more numerous composting facilities would reduce the need to concentrate materials in one place and lessen the traffic and environmental impacts that are difficult to avoid at large facilities. Towards this goal, Greenleaf Composting — in conjunction with the nonprofit Boston Urban Gardeners — applied for and received a \$15,000 grant from the Massachusetts Department of Food and Agriculture (DFA) to develop urban composting models on both small and moderate scales. Greenleaf Composting is a Boston based business specializing in innovative organic materials management strategies that support urban agriculture and decentralized composting. Boston Urban Gardeners is a nonprofit organization dedicated to promoting agricultural use of urban land in Boston. There are more than 120 community gardens on some 40 acres in parcels ranging from less than one quarter of an acre to more than 15 acres.

Greenleaf's work has included developing active composting programs at 10 community gardens. In April, 1994, it initiated a composting project for food residuals and cardboard from Boston's open air produce market, The Haymarket at Allandale Farm, a 150 acre working farm located in Boston and the adjacent town of Brookline. Now in its eighth month of operation, approximately 2,000 cubic yards of organic materials are being managed by Greenleaf on two sites at the farm. In addition to the Haymarket's residuals, feedstock generators include Boston's Franklin Park Zoo, an inner city nonprofit food salvage operation run by Fair Foods, local landscapers, and municipal and private sources of leaves and wood chips. This program is demonstrating that selected urban organics can be effectively composted on agricultural sites within the city limits and returned to productive local use. Allandale Farm provides the land and water for the operation and in return has free tipping privileges for crop and market residuals from its 40 acres of vegetables and a farm stand, and will receive up to one half of the compost produced.

FEEDSTOCK LOGISTICS

Haymarket food residuals represent a highly visible fraction of Boston's organic resource stream and one that has been disposed of at considerable cost through traditional disposal methods. More than 40 tons of organic residuals consisting of fruit, vegetables and corrugated cardboard are generated weekly at the Haymarket, which is sandwiched between the city's financial district and the heavily touristed North End.

Haymarket has been operating in some form since the 1700s. Until the early 1900s, produce from more than 6,000 farms was drawn by horses into Boston. Since the 1950s, The Haymarket has been operated by the Pushcart Vendors Association in approximately its present form. Boston's Public Works Department spends up to \$150,000 of state appropriations on Haymarket's solid waste disposal costs annually. Last year, DFA informed the City of Boston that continued appropriations for disposal costs were contingent upon composting some of the market's organic residues.

Prior to this directive, DFA and the Massachusetts Department of Environmental Protection (DEP) had been working for more than two years to implement the separation and composting of organics from Haymarket. Dedicated involvement by officials from both agencies was imperative in making improvements in presorting and loading organics into the city's collection vehicle. Initial efforts produced a low capture rate and poor separation. The separated organics were sent to a composting site located in central Massachusetts, adding substantially to disposal costs borne by the taxpayers of Massachusetts. Because the Haymarket operates on Fridays and Saturdays, organics were transported at the close of the market on Saturdays, resulting in higher labor costs for overtime wages for the driver.

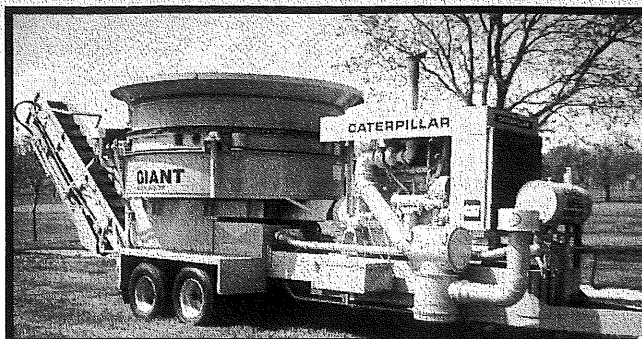
In May, 1994, the Franklin Park Zoo began delivering to Allandale a blend of animal bedding (wood shavings and hay) and manure from herbivorous animals such as camels, gazelles and warthogs. In June, Greenleaf began composting Allandale's crop residue and market stand organics. These include spoiled fruit and vegetables, pomace from apple cider pressing, and some waxed and food contaminated corrugated cardboard from the farm stand. Partially composted leaves — used for bulking agent and cover material — come from the City of Boston's compost site at the Boston State Hospital, the Forest Hills Cemetery in Boston, and the Town of Weston's stockpile.

Fair Foods, an inner-city organization, salvages and redistributes more than four million pounds of food annually in Boston's low income neighborhoods. They have delivered truckloads of separated food residuals and nonrecyclable corrugated cardboard to the Allandale Farm site from the Chelsea Market and a variety of other sources. Materials collected by Fair Foods were carefully separated and were the cleanest and most concentrated source of food residuals other than farm organics that have been received.

SITE MANAGEMENT

The first composting site at Allandale Farm was selected for temporary use because it was unused agricultural land located in the Boston portion of the farm, and the organic feedstocks being imported were generated within Boston city limits. The site is close to a road but visually screened by surrounding foliage and elevated 10 feet above the road. The closest resident is 105 feet from the nearest windrow. The next closest occupied building (about 500 feet) is the Boston Police Stables which generate some 10 to 15 cubic yards of horse manure and bedding weekly and could be a future contributor of organics.

The windrows curve underneath a high canopy of large oak, white pine and hemlock trees. Site runoff is buffered by a spongy layer of forest soil and massive root systems downslope for hundreds of feet from the compost site. When this area reached capacity in July with approximately 700 cubic yards on-site, tipping was suspended and the windrows were capped and seeded with rye grass as a cover to camouflage the piles while they continue to mature. The rye on the windrows also serves as a raised salad bar for cows that are pastured in the scrub underbrush around the site. Later this winter, these windrows will be turned and then cured before being applied to adjacent cornfields for the next growing season. All of the disturbed soils have been revegetated to re-



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store the site close to its original state.

In late June, 1994, Greenleaf opened a new half acre site at Allandale Farm that is suited for year round use. Materials can be managed more effectively at this site due to greater capacity, better access and maneuverability, superior grading and an ample supply of suitable base materials for the pad. It is also well buffered by dense foliage on the two sides of the site closest to the farm entrance and is adjacent to fields that would benefit from compost applications to replace depleted topsoil and improve tilth and water holding capacity. The flow of organics has increased to more than 100 cubic yards per week with the addition of leaves and chipped brush from selected local landscapers.

The feedstocks are brought to the site and tipped on a prepared pad with a two to three percent slope. Contaminant removal from the market residues is performed when required. The materials are watered and mixed in layers with partially composted leaves and manure on a bed of woodchips. Greenleaf's track loader operator performs all the site preparation and windrow formation. Air is passively drawn in through a base matrix of perforated PVC pipes nested in the layer of wood chips. Temperatures regularly exceed 140°F for a week or more using this mixing and handling procedure.

Greenleaf tested a small portable turner on fresh and partially composted feedstocks in July. In December, 1994, it will receive a 2.5 meter, self-powered compost turner. This machine will be used for the secondary phase of composting to perform size reduction, aeration and more thorough mixing of windrowed material on site.

OPTIMIZING THE PROCESS

The greatest challenge to date has been addressing contamination issues with the Haymarket food and corrugated residuals delivered to the site. The market's organic stream is collected by a crew of three employees of the Haymarket Pushcart Association representing some 80 produce vendors. These materials are loaded into a 30 cubic yard compactor truck operated by the Boston Public Works Department. Load composition ranges from 70 percent to 95 percent corrugated by volume; nonrecyclable waxed cartons typically comprise more than 50 percent of that amount. Typical physical contaminants include film plastics, plastic strapping, and small amounts of plastic, metal and glass containers. These materials are removed by hand after the loads are tipped on site. By providing regular feedback on the quality of each load to the involved agencies and to the Boston Public Works truck driver who delivers the Haymarket material to the composting site each week, the level of contaminants has sharply declined. A final screening following a curing phase will remove the remaining noncompostables.

In the first six months of operation, the composting project has provided a testing ground for varying feedstocks, odor control techniques and cost analyses while experi-

The implementation of a successful organic materials recovery program depends on a good site selection process and active involvement with the host community in design and management.



A Boston Public Works Department collection vehicle delivers Haymarket organics to Allandale Farm (top). Corrugated residuals are processed by a farm scale turner before composting.

encing few problems. Greenleaf Composting has experimented with procedures for removing contaminants from incoming food residuals, tested odor control methods, windrow formation, watering and turning and has tailored a variety of recipes to the available materials, equipment and labor.

Both sites are near the borders of Allandale Farm and three strategies have been effective in minimizing the risk of contact with the neighbors over odors. Small deliveries of potentially odorous materials can be handled more readily, and speedy incorporation into windrows minimizes the exposure time of odorous materials to air. Good base materials, appropriate grading and ample supplies of woodchips have prevented liquids from pooling and generating odors. In addition, quickly capping odorous materials with partially composted leaves and providing a passive air supply to composting materials, also have been effective. Temporary treatment with odor neutralizing sprays on particularly pungent materials has been used occasionally during tipping and windrow turning when wind direction warranted more aggressive measures.

This start-up phase also has established Greenleaf's costs for handling materials and

removing contaminants, the rate of decomposition of a number of mixtures of ingredients, and allowed the operator to refine equipment requirements and process a greater volume and diversity of materials.

This winter, growth trials and testing of finished compost in greenhouse settings will begin. This also will enable Greenleaf to make use of the heat, moisture and CO₂ generated as by-products of the composting process by cultivating a diverse crop of vegetables and ornamentals. By spring of 1995, 1,000 cubic yards of finished compost will be available for field application at Allandale Farm and for distribution to some of Boston's 120 community gardens. A portion of the compost will be marketed to the public.

ENCOURAGING AGRICULTURAL COMPOSTING

This project has fostered greater local recycling of urban organic residuals, and will improve urban soils and the productivity and fiscal viability of valuable agricultural land at Allandale Farm. Since start-up, the intake of materials has increased from 25 cubic yards to more than 100 cubic yards weekly. The long-term viability of this operation will depend upon increased revenues from tip fees, compost sales and plant production on the site. This will require increasing the volume processed on the site and/or receiving higher tip fees per cubic yard of material processed. The operation has successfully demonstrated that these challenging materials can be composted close to their point of generation. Greenleaf is now negotiating tip fees competitive in the local disposal market and expanding to other sites in and around Boston. By merging agricultural production with environmentally sound siting and operation of composting facilities, a wider network of composting sites will be able to serve the region's organics management needs in the years to come.

The costs of collection, transport and disposal of organic resources can be used to stimulate local agricultural employment, contribute to local taxes, and improve the city's image and self reliance. This approach recognizes that the neighborhoods themselves hold some of the resources essential to the development of a viable program, including vacant land, motivated and skilled young adults, consumers of horticultural products, and community gardeners.

Public and private sector funds currently dedicated to disposing of Boston's solid waste are a source of capital that can be recycled more effectively through the communities that generate the wastes. The combined economic potential of the "solid waste dollars" presently dedicated to waste management and the recovered value of the materials in the waste stream merits the consideration of new collection, processing and end use scenarios. ■

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