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CO-COMPOSTING OF LANDSCAPE AND VEGETABLE WASTES AT INSTITUTIONS WITH FOOD SERVICE FACILITIES

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Abstract. **An evaluation of co-composting of kitchen vegetable and landscape wastes, at three institutions with food service facilities, was conducted from March to July of 1992. Vegetable wastes were layered with chipped and shredded landscape wastes in 4 foot diameter composters made of vinyl-coated wire fencing. Compost produced had a lower carbon to nitrogen ratio (C:N), was a dark brown color with fine particle size, and its temperature had stabilized. No unacceptable odor or animal problems developed. Two of the three institutions felt the process was logistically manageable. Cost analysis demonstrated that co-composting has the potential to save money over the year.**

The Florida Solid Waste Management Act of 1988 prohibited the disposal of landscape wastes (leaves, prunings, dead branches and grass clippings) at lined landfills after January 1, 1992. Efforts to promote the utilization of these wastes for mulch or compost have been mainly directed toward residences, not institutions.

In Alachua County, a separate municipal yard waste pickup, for delivery to a private recycling facility, was instituted prior to January 1, 1992. This service is available to institutions through rental of a dumpster exclusively for yard wastes. Monthly rental and service charge for the large eight cubic-yard dumpster is $135.00 per month or $1,620.00 per year. The expense might be reduced if the need for the dumpster and pick up were eliminated by recycling the wastes on site as mulch or compost.

Landscape wastes in Alachua County that were collected by residential curbside pickup had carbon to nitrogen ratios (C:N) of over 90:1 (Barkdoll and Nordstedt, 1991). The co-composting of high carbon yard wastes and these high nitrogen materials, like manure, green manure or nitrogen fertilizer, has been long and widely recommended for successful composting because microorganisms that decompose require a C:N of 20:1 to 30:1 for best results (Minnick and Hunt, 1979; Rynk, 1992).

Finished compost is generally defined in terms of physical and chemical characteristics. Most widely described are a dark brown to black color, small particle size, much reduced C:N from the original landscape waste, and stabilized temperature (Minnick and Hunt, 1979; Rynk, 1992).

Most institutions do not generate enough high nitrogen materials on site from the landscape. However, those with food service facilities, such as hospitals and business headquarters, do generate high nitrogen waste from kitchen vegetable preparation.

This project was initiated to evaluate the potential for co-composting landscape and kitchen vegetable wastes at these institutions. Therefore, answers to the following questions were sought:

1. Would the simple co-composting of landscape and kitchen vegetable wastes produce acceptable compost?
2. Would the composting process create unacceptable odors, be visually unacceptable or attract animals?
3. Could the compost produced be utilized effectively on site?
4. Would the process be logistically manageable?
5. Would the process of composting and recycling these materials on site be cost effective?

Materials and Methods

Three institutions were identified and agreed to cooperate in the project which ran from March through July of 1992. The first was an insurance company regional office that had seven acres of heavily wooded and landscaped grounds. They did not lease a dumpster but had accumulated yard wastes in a wooded site over the 10 years since the building was constructed. The pile had an estimated volume of 100 cubic yards. The company felt it either had to pay to have yard waste picked up, start leasing a dumpster, or compost it. Its kitchen served over 2,000 meals and generated about one-half cubic yard of preparation vegetable waste (lettuce, cabbage and kale leaves; onion, tomato, cucumber, broccoli, and citrus scraps; and coffee grounds) per week, which was disposed of through normal garbage collection.

The second cooperator was a state institution for the handicapped that had over 200 acres of heavily wooded grounds. It leased an eight cubic yard dumpster solely for landscape wastes. Its cafeteria served over 15,000 meals and generated about one cubic yard of vegetable waste per week which was disposed of through normal garbage collection.

The third cooperator was a private hospital with a heavily wooded landscape on 25 acres. The landscape waste was put in a leased eight cubic foot dumpster. The cafeteria served over 12,000 meals and generated an estimated one-half cubic yard of vegetable waste per week. Vegetable waste was put through a kitchen garbage disposal connected to the municipal waste water system.

A grant from Alachua County Recycling funds provided for the hiring of a technician as well as the purchase of three chipper-shredders and materials for composter construction. A chipper-shredder was loaned and three composters were constructed and provided to each institution. The technician met with and advised staff from each institution on the use of the materials and maintenance of the composters every week throughout the grant period.

The composters were constructed of four-foot high, vinyl coated fencing formed into a four-foot diameter cylinder and secured to the ground with three five-foot

Table 1. Average tissue mineral content of kitchen vegetable wastes, landscape wastes and compost.[y]

Institution	Material	% N	% P	% K	% Ca	% Mg	% Total Solids	% ORganic Matter	% C[z]	C:N
1	Kitchen	2.66	.32	2.80	2.84	.17	15.87	87.72	49.12	18.47
	Landscape	0.78	.07	.39	1.03	.08	64.02	81.12	40.29	58.24
2	Kitchen	2.56	.33	3.94	1.00	.27	7.25	84.35	47.24	18.45
	Landscape	0.68	.06	.26	.82	.09	77.92	91.63	51.31	75.46
3	Kitchen	2.82	.24	4.98	.91	.33	6.93	81.41	45.59	16.17
	Landscape	0.74	.05	.30	.35	.08	51.79	92.39	51.74	69.91
1	Compost	1.31	.11	.56	.74	.15	10.23	53.64	30.04	22.93

[y]Percents are expressed on a dry weight basis.
[z]Carbon was estimated at 56% of organic matter.

pieces of steel reinforcing bar. The cost was $10.74 for materials and $3.25 for labor (1/2 hour at $6.50 per hour) for a total cost of $13.99 per composter. Three composting units were set up at each location.

Kitchen workers put vegetable waste into plastic garbage cans or bags. They were picked up and taken to the composting area at the back of each institution twice per week. Each time, accumulated landscape wastes (primarily prunings and dead branches) were chipped in sufficient quantity to layer (five inches), alternately, with the vegetable waste. Composting materials were watered to keep them moist and temperatures were monitored during the composting process. Samples of kitchen and landscape waste, as well as finished compost, were taken for laboratory tissue mineral analyses.

The average time required was three hours with a labor cost of $19.50 per week. The cost of gasoline averaged $1.00 per week.

Results and Discussion

Average tissue mineral and organic matter content from analyses and the calculated C:N are shown in Table 1. Kitchen waste at the three institutions was relatively high in nitrogen, all just above 2.5%. Landscape waste was low, all under .8%. The C:N values were all lower than 20:1 for kitchen waste and higher than 55:1 for landscape wastes. The nitrogen level of finished compost was moderate at 1.31% and the carbon to nitrogen ratio was low at 22.93, much reduced from that of the landscape waste.

The compost was dark brown and of fine particle size with very little of the parent waste material distinguishable. In addition, the temperature of the compost had dropped from over 140°F to ambient temperature.

During the composting process no unacceptable odors were generated nor were any complaints made about the composter being visually unacceptable. Only once, when a layer of kitchen waste was not sufficiently covered, were animals attracted to a composter.

The first institution was the only one to have finished compost by the end of the grant period and they incorporated this compost into flower beds, with good results, replacing purchased peatmoss that cost $240 annually.

The co-composting process was considered logistically manageable by two of the three institutions. At the hospital, the materials had to be moved too far and workers did not have sufficient time available to keep up with the chipping. They failed to complete the project and did not produce finished compost.

The costs for an institution to co-compost included $350 for a chipper-shredder, $41.97 to construct three composters, $52.00 for gasoline and $1014 per year in shredding/composting labor (at $6.50/hour) for a total of $1,457.97. Subtract $240 saved by replacing purchased peatmoss as a soil amendment for flower beds and the yearly cost was $1,222. This is a savings of $398 over the $1,620 spent on the renting of a dumpster. However, these two institutions did not consider the labor a cost because they used existing workers and the time diverted from other activities per week was so small.

Since food wastes are a major contributor to gas and leachate generation in sanitary landfills, on site composting of food wastes with landscape wastes from both residences and institutions, would result in other reductions in overall solid waste management costs.

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