CLEAN ORGANIC WASTE COMPOST PRODUCTION AND EVALUATION IN SOUTH FLORIDA

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INTRODUCTION

Composting is an attractive waste management tool, since 30% to 60% of the waste materials can be composted into an environmentally safe matter (Smith, 1994a). In Florida, municipal solid waste (MSW), yard trimmings (YT) and biosolids are high-volume wastes that could be recycled into compost instead of landfilled or incinerated (Goldstein, 1997). Smith (1994b) reported that the largest portion of solid waste is MSW (12million tons) followed by YT (3 million tons and animal manure (0.5 million tons) in Florida. Using compost in agriculture reduces the need to expand landfills or build incinerators. Additionally, amending Florida's sandy soils with compost may reduce the frequency and rate of irrigation and inorganic fertilizer applications (Ozores-Hampton, 1993). New technology and development of processed solid waste materials have made high quality products available to the agricultural community (Bryan and Lance, 1991). From the Urban viewpoint, compost production represents a safe disposal method for thousands of tons of waste materials produced each year (Ozores-Hampton, et al., 1998). Based on these facts, the need to recycle food wastes produced in south Florida into clean composts evolved.

An investment of two years work and $328,000 of Dade County taxpayers money produced an effective and successful Clean Organic Waste (C.O.W.) compost pilot project. This success was attainable by the contribution, cooperation, assistance and guidance of consultants, engineers, researchers, administrators, regulators, technicians, managers, scientists and commissioners in Florida mainly in Miami-Dade County. South Dade Soil and Water Conservation District (SDSWCD) was instrumental in obtaining the funds to support this project and preparing and submitting quarterly reports to the county. A final report was published on C.O.W. compost in 1997 (Levy et al., 1997).

In this manuscript construction of C.O.W. facility; compost production, compost evaluation, marketing of C.O.W. compost, benefits of the C.O.W. project, problems encountered, conclusions and recommendations will be discussed.

CONSTRUCTION OF C.O.W. SITE

The Metro Dade County Department of Solid Waste Management (DCDSWM) provided funding for the project. The 0.8 ha C.O.W. facility was designed by Stone and Webster Engineering Corp., Miami, Florida and was constructed by C.A. Associate, Inc., Miami, Florida. It began in February 1995 and was turned over to SDSWCD five months later. The facility was permitted to process 3,000 tons of C.O.W. compost per year at University of Florida Tropical Research and Education Center (UF-TREC), Homestead, Florida.

The 4 segments of the facility were: 1) a mixing pad, 2) four asphalt compost pads, 3) an elevated leachate pond and 4) a storage area. The compost production at each segment is discussed in detail in the compost production section.

COMPOST PRODUCTION

The facility included a mixing pad of 61m x 12.5m for commercial and institutional food residuals and shredded mulch from nurseries and yard wastes (Figs.1 and 2). A conveyor belt and a hammer mill to shred large wood pieces were located on the mixing pad (Figure 3). A front-end loader pushed approximately 1part food scraps and 1 to 2 parts mulch into a pile. A tractor drawn Scat Model 482B windrow turner mixed food wastes with yard mulch. It also aided in aerating and turning the piles on the mixing pad (Fig. 4). Periodic turning of the piles and addition of enzymes through a spray applicator attached above the elevator conveyer were done with the windrow turner (Fig. 4). These enzymes were necessary to eliminate anaerobic fermentation, odor problem and accelerate the composting process. The process took 2-4 weeks before piles were moved to one of the four asphalt composting pads. Compost pads were designed for 30m long, 5 m wide and 2m high windrows (Fig. 1). Two pads received mechanical turning of the piles for aeration and the other two pads received forced air aeration for static windrows through PVC pipes (Figs. 1 and 5). A layer, 0.5 m thick, of wood chips was placed over aeration PVC pipes as a bed for the compost. This facilitated aeration of the static aerated windrows. Piles were watered with sprinkler system set between the piles. At this stage, frequency of turning the piles (about twice a week) depended on piles' moisture and oxygen contents, and temperature. Periodically, temperature and moisture samples were taken from windrows at 45 and 90 cm deep. Piles remained in turned windrows for 4-5 weeks before they were ready to be moved to the storage area. Static aerated windrows required over 12 weeks to mature the compost. An elevated aerated leachate pond of 322,000 liters capacity was built next to the 4 compost pads to collect runoff during heavy rainfall (Fig. 1 and 6). Piles were screened then moved to a storage area (Fig. 1). The purpose of this step was to screen out the small rocks, large wood chips and other extraneous material from compost piles. Samples for quality inspection and analyses were taken from windrows during the composting process.

Figure 1. Schematic diagram of Clean Organic Waste Composting Site Plan.

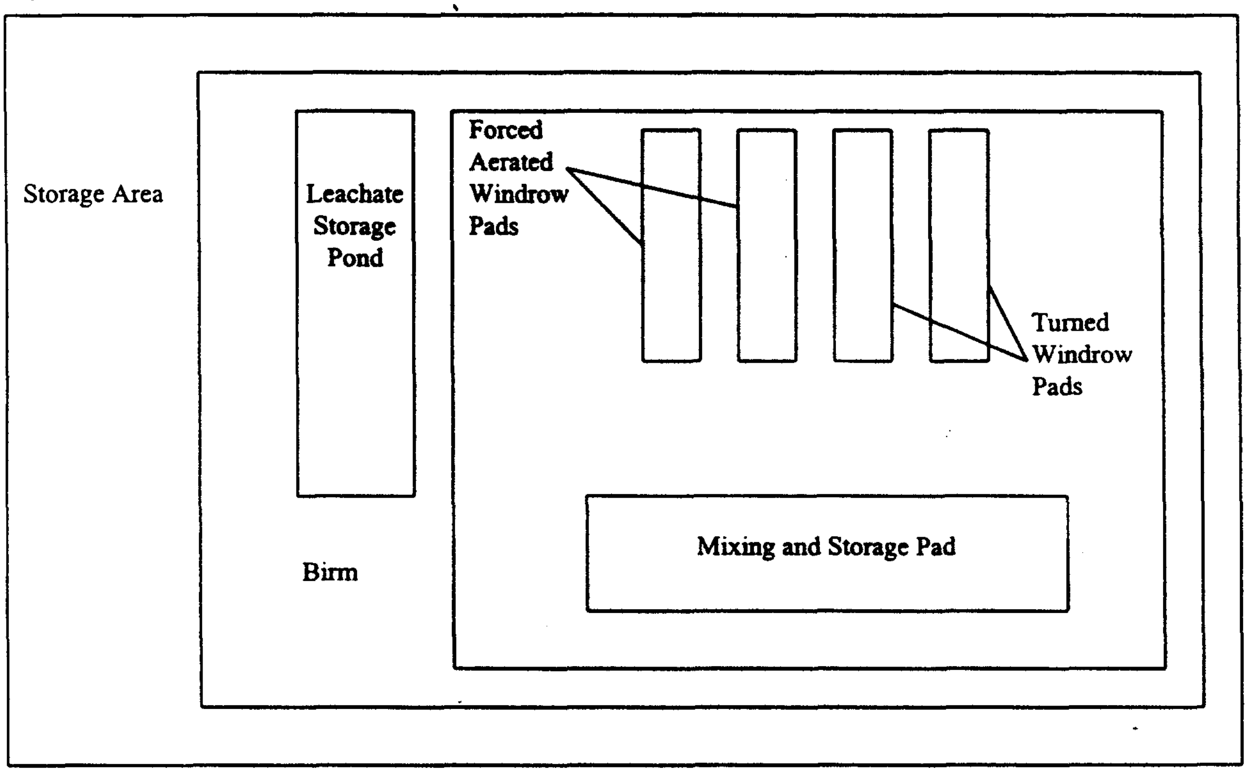

Figure 2. An aerial view of C. O. W. compost site at UF-TREC, Homestead, Florida.

Figure 3. Hammermill, Conveyer and Mixing Pad.

Figure 4. Scat windrow turner with enzyme spray boom above the conveyer.