

TESTING FOOD SERVICE PRODUCTS

COMPOSTABLES TRIAL AT MUNICIPAL YARD TRIMMINGS OPERATION

ESTABLISHED in the mid-1980s, the Miramar Greenery composting facility currently operates on 75 acres in the City of San Diego, California. The facility annually processes over 100,000 tons of organic material. In the past decade, the city's Environmental Services Department (ESD) launched a food scrap composting program to service large, local commercial institutions (e.g., public venues, stadiums) at the Greenery.

Source separated food scraps are delivered to the Greenery and unloaded into a horse-shoe-shaped barrier of ground yard trimmings. The load is mixed with those trimmings and placed into an open windrow. After 10 weeks of turning and watering, the material is screened into half-inch compost, 2-inch mulch and 4-inch overs using a Komptech XL star screen. The 11 regular participants in the food scrap program contribute approximately 2,500 tons/year of food scraps.

Each generator receives extensive training at their site and a 6-month trial before being accepted as a regular participant. Two of the existing participants are the San Diego Earth Fair and the San Diego County Fair. Various other zero waste events in the city are accommodated as well.

Unlike many composting facilities, the Greenery does not preprocess, shred or grind food scraps before incorporating them into windrows. The Greenery also does not accept any incoming organic material in bags, whether traditional plastic or compostable. Bags inhibit the staff's ability to easily identify contamination. These two operational variables contribute to the structure of the entire food scrap composting program.

INITIATING THE TRIAL

In anticipation of receiving more participants in the food composting program, the ESD decided to initiate a compostable prod-

Materials in the selected products included plastic (e.g., PLA, starch-based polymers and blended resins), paper, paper with linings, bagasse, wood and pressed leaves. An item number was assigned to each product.

City conducts study to determine whether products labeled as compostable and/or biodegradable would successfully break down in its open windrow composting process.

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Photos by Paige Hailey

ucts trial. Many prospective participants expressed interest in single-use compostable products; however, past feedback from Greenery operations staff indicated that these products did not typically breakdown in the city's composting process. The goal of the study was to verify if compostable products degrade in the Greenery's composting process and also to identify tableware products that would be accepted in food scrap loads.

The project began with market research and selection of 105 different compostable products to test. Selection was based on suggestions from current and prospective food scrap program participants as well as local availability, diversification of uses, cost and an assortment of material composition. Ma-

terials in the selected products included plastic (such as polylactic acid (PLA), starch-based polymers and blended resins), paper, paper with linings, bagasse, wood and pressed leaves. The majority of the products selected meet American Society for Testing and Materials (ASTM) standards (either ASTM D6868 or ASTM D6400 standards for biodegradability and compostability), and many have Biodegradable Products Institute (BPI) certification. However, some products that have not undergone ASTM evaluation were intentionally tested as well. All of the products were bought off the shelf or through websites in January 2010.

An item number was assigned to each product and individual portfolios were created. Information in the portfolio included manufacturer identification number (UPC or SKU), brand and manufacturer, material

the center of an active composting windrow. After the first week, with temperatures hovering around 145°F, the bags were removed and the windrow was aerated using a Scarab turner. The contents of the bags were emptied, sifted through, and the samples were individually evaluated for decomposition. The evaluation included photographs, measurements and a detailed description of each product. Particular attention was given to any changes in color, texture, size and fragmentation. After evaluation, the bags were reconstituted using the same feedstock and placed back in the center of the windrow. The bags were removed from the windrow and samples evaluated once every two weeks over the 10 week study.

The final time the bags were removed, all sample fragments were collected and each item's final measurement was taken. Each product portfolio was analyzed and then classified into five categories of degradation depending on the percentage of decomposition: 0 to 24 percent, 25 to 49 percent, 50 to 74 percent, 75 to 99 percent, and 100 percent. For example, if a product's remaining measurement was greater than 80 percent of the original, then the product degraded less than 75 percent and it was categorized as a 0 to 24 percent biodegradation rate.

Table 1. Biodegradation results

Percent of Total Degradation (%)	Number of Products
0-24	56
25-49	1
50-74	3
75-99	8
100	37

The results of the study are summarized in Table 1. More than half of the 105 products did not biodegrade greater than 25 percent! Four products degraded between 25 to 74 percent, three products degraded between 75 to 99 percent, and 37 of the 105 products completely degraded.

Further analysis of the data determined the majority of the 37 products that completely biodegraded were made of PLA. In fact, 26 of those were comprised of pure PLA (i.e. PLA without the inclusion of any additives for desired plastic characteristics such as strength, malleability or heat resistance). On the other hand, all the other material types tested had very inconsistent results. For example, seven bagasse products, from a variety of manufacturers, completely degraded; however, 20 other bagasse products did not. None of the compostable cutlery showed any real sign of degradation. All

or resin type, supplier, certifications and standards met. The portfolio also included photographs of each product, initial measurements, and a detailed description.

EXPERIMENT DESIGN AND RESULTS

Mesh onion bags were used to contain the samples and compost feedstock — approximately 30 percent compostable/biodegradable products and 70 percent active compost (food scraps and yard trimmings) by volume. Each bag held three to four samples of a given product with an average of three to five product types equaling a total of 15 to 20 items per bag.

To expose materials to the most ideal composting conditions, the bags were placed in

Mesh bags contained the samples and compost feedstock. They were lined up numerically in the windrow.



wooden and leaf items partially degraded, which is comparable to the rate of biodegradation of small branches or woody matter in the windrow.

Ultimately, the city's results indicate that there was no consistent pattern of biodegradation in the materials tested (other than the items of pure PLA).

ASTM has two standards related to biodegradation. ASTM D6400 and D6868 standards require the material to disintegrate and biodegrade within a specific time period. Although ASTM tested and BPI certified products did show greater degradation

Bags were removed from the windrow and samples evaluated every two weeks over the 10-week study. None of the compostable cutlery showed any real sign of degradation.



potential in most cases, there was no conclusive evidence from this study to suggest that all certified products will fully degrade at the Greenery. In fact, 15 items that were both ASTM and BPI certified showed almost no effects of biodegradation at all.

The results of this study led to a decision to hold off accepting any type of compostable products at the Greenery as routine feedstocks. Two components of the results factored strongly into this decision: 1) the unpredictable degradation rates of the materials; and 2) the obvious lack of degradation by the majority of the products tested in the Greenery's composting process. It should be noted, however, that our testing methodology necessitated removal of the compostable item prior to each windrow's turning with the Scarab. In actuality, several of these products would likely have decomposed more completely if they were subjected to the mechanical forces of the compost turner agitating the pile.

In conclusion, this study is not the end of the Greenery's relationship with compostable products, but rather the beginning. Although the above results may be extrapolated to indicate what might happen in a static aerated pile composting system, the actual conditions at the Greenery were not mimicked. The ESD is now moving to limited actual testing of products in the agitated windrow process to determine how much a factor the test conditions (i.e. isolating products in onion sacks) were in retarding degradation. From June 15 to July 5, 31 tons of post and preconsumer food waste from the San Diego County Fair — complete with paper plates, wax coated paper cups and PLA cold cups — were accepted. Stay tuned for more results!

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Overcoming Cross-Media Challenges

This conference brings together organic residuals industry professionals, municipalities, regulators, researchers and other stakeholders to identify and help realize options that provide the greatest ecological and municipal benefits for manures, biosolids, food wastes, green wastes and other organic residuals. Discover options that best serve to reduce greenhouse gas emissions, provide local sources of fuels and fertilizers, help restore soils, ensure food safety, and protect public health and ecosystems.

A challenge to realizing many organic residuals projects derives from the regulatory permitting process and conflicting objectives among government agencies. A particular focus of this conference will be how our regulatory processes can be adjusted, so net environmental benefits can be realized.

Sponsors

Sponsors include the U.S. EPA Region 9, California Department of Resources Recycling and Recovery, Central Valley Regional Water Quality Control Board, USDA Natural Resources Conservation Service, USDA Rural Development, Western United Dairymen, Sustainable Conservation, California Association of Sanitation Agencies, Sacramento Municipal Utility District (SMUD), BioCycle Magazine and UC Davis Extension.

- 2 meetings.
- Sept. 14-15: Tues.-Wed., 8 a.m.-5 p.m.
- Sacramento: Sacramento Convention Center, 1400 J St.
- \$195. Includes refreshments and meals, a social and a field trip. Enroll in section 102HSD590.

For more information or to enroll, please contact us at (800) 752-0881 or visit our website.

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