



## **Rate Of Biodegradation Of Plastics In Landfills Vs. Compost Facilities**

*Must plastic biodegrade in a landfill in the same “short period of time” as a compost facility?*

There is a puzzling position in a portion of the environmental community which believes in order to claim a plastic material biodegradable in a landfill, at least 90% of the carbon substrate must be completely assimilated by the microorganisms present in the disposal channel within a “reasonably short period of time”? Our simple question is, why?

One reason presented is the safety concern with partially degraded plastic in landfills. The argument is if it takes plastic a long time to biodegrade (over a year per proponents of biodegradation in composting sites) it poses an environmental hazard. The belief is that certain components of biodegrading plastic could leach into the soil and get into ground water. However, this is an inaccurate assumption. All landfills built since 1993 conform to the October 1991 Criteria for Municipal Solid Waste Landfills (40 CFR Part 258) under the Resource Conservation and Recovery Act (RCRA). These criteria include subsurface migration controls and require liners to be in place that do not allow material to leach into the soil.

So where did the notion of time come from? The answer is from industrial composting sites. These sites have a need for a defined time for biodegradation since they have to make room for the next batch of incoming organic waste. However, for a disposal channel such as a landfill where anaerobic (without oxygen) biodegradation takes place, it really does not make sense to define and impose a similar compressed time frame for plastics to biodegrade. Reason would seem to indicate, since plastics stay in landfills for a very long time – hundreds of years, it would be a true environmental win if an additive embedded in plastic would enhance biodegradability such that it would allow for significant biodegradation within several years and the resulting methane gas could be used as a source of energy.

Specifications and test methods are defined and designed to measure the rate of biodegradation for compostable plastics (60% loss of carbon for homopolymers and 90% for copolymers in 180 days). Composting sites follow a regimented procedure (controlling temperature and moisture) making it relatively easy to follow standards. Every landfill on the other hand is different. Even the new bioreactor landfills are different from each other. How can one say that plastic in these varying microbial and humidity conditions must biodegrade within a prescribed (and short) period of time?



This is precisely why a specification similar to ASTM D6400 for biodegradation in landfills does not exist, although attempts are currently underway to create one.

In the past few months a study led by a doctoral student James Levis under the guidance of Prof. Morton Barlaz at North Carolina State University, Raleigh, North Carolina has got a lot of press. It relates to the impact of the rate of biodegradation in landfills. Many have incorrectly inferred from this study that biodegradation in landfills is bad for the environment. Not only has that not been said in the report, the author points out that “In landfills with methane capture projects plastics are a tremendous untapped resource”. If biodegradable plastics were designed to decay more slowly in landfills, Prof. Barlaz says, landfill operators would be able to capture more of the methane for fuel. This further embellishes the theme of this paper that it is not necessary and in fact not a good idea for plastics to biodegrade at an accelerated pace.

In conclusion, we believe any plastic product that could potentially end up in a landfill environment could include the additive Eco-One™. This would enhance the biodegradation of plastic products in a biologically active landfill and allow for methane capture for energy. This would also increase the life of the landfill because of the reduction of millions of tons of plastic that would otherwise sit there for hundreds of years.