



NaturTec™

Sustainable Biobased Materials

2016 Ei Partner Meeting

The Macro Cost of Micro Contamination

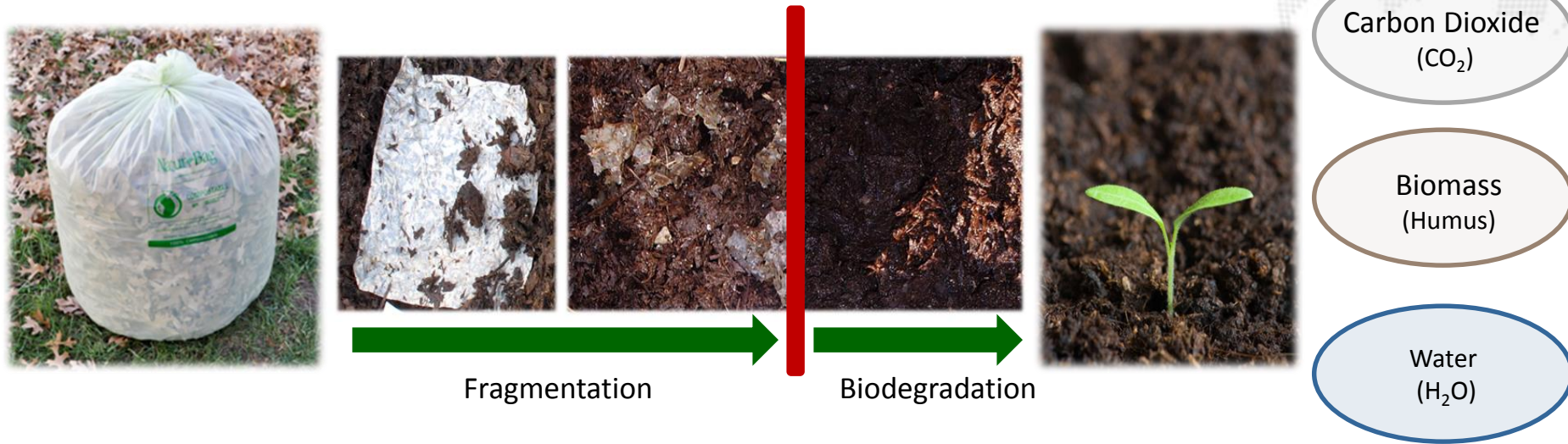
Compostable Plastics v Traditional Plastics



- Compostable plastics and what to look for?
- What are traditional plastics?
- Plastic contamination in soils
- Presentation takeaways

Compostability

Fragmentation and Biodegradation



Fragmentation – first step in the biodegradation process, in which organic matter is broken down into microscopic fragments

Biodegradability – *complete* microbial assimilation of the fragmented product as a food source by the soil microorganisms.

Compostability – complete assimilation *within 180 days* in an industrial compost environment.

ASTM D6400

- *Specification* for Compostable Plastics
- For plastic films and solid plastic products



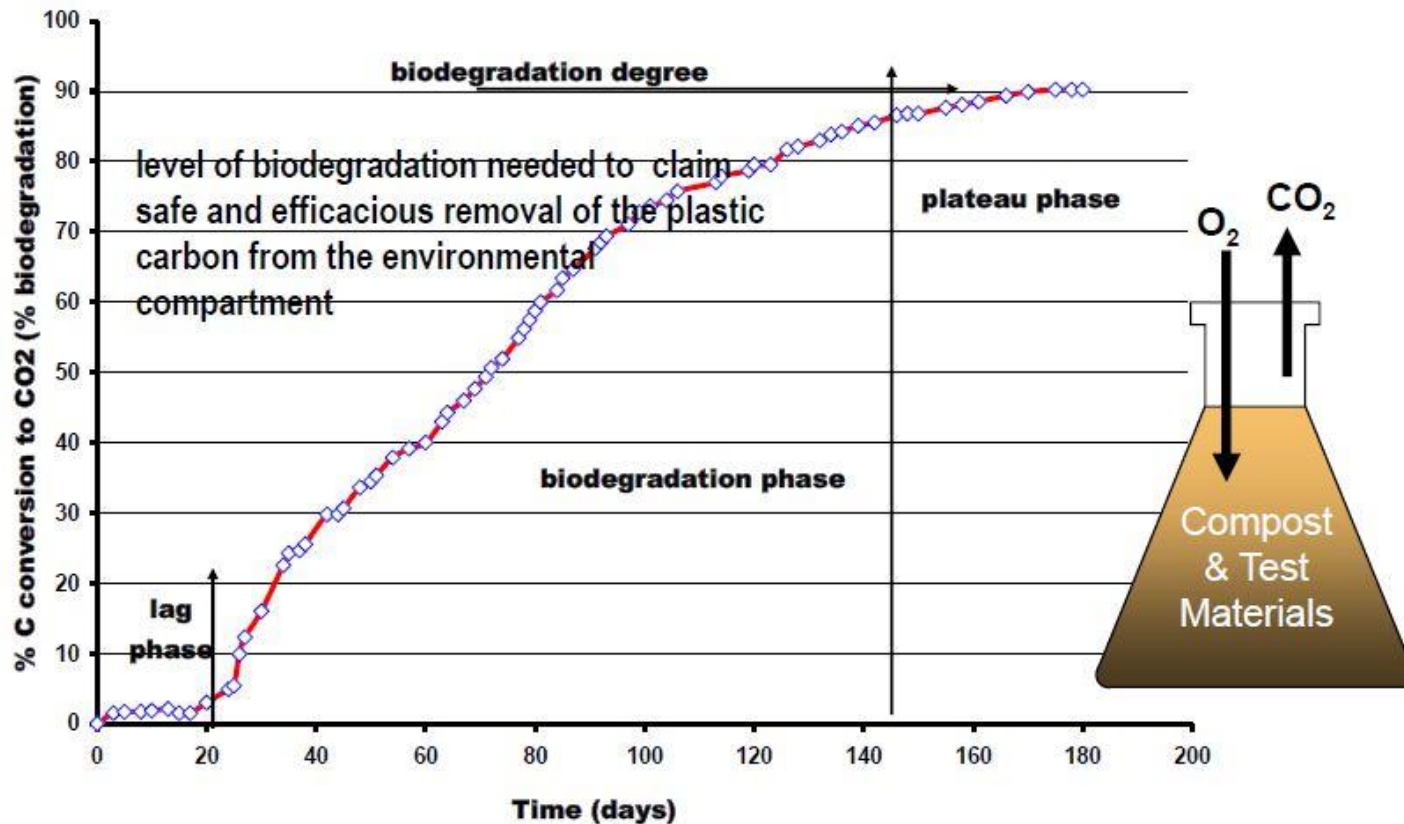
ASTM D6868

- *Specification* for *Compostable Plastic* used on Paper and other Compostable Substrates
- For packaging and food service items, made of plastic coated paper, board, and other fibers



Similar to European, Japanese, and ISO Standards

AEROBIC (composting environment)



ASTM D6400 Specifies Three Criteria

1. Disintegration (Section 6.2)

- Less than 10% of test material remains on 2mm sieve
- Controlled compost conditions at thermophilic conditions (135°F / 58°C) as defined in **ASTM D5338** & **ISO 16929** test methods
- *Time: 12 weeks or less (84 days)*



2. Mineralization / Inherent Biodegradation (Section 6.3)

- *90% Conversion* to carbon dioxide, water & biomass via microbial assimilation
- **ASTM D5338** – defines test method used
- *Time: 180 days or less* (the same rate as natural materials - leaves, paper, grass, food scraps)



3. Safety (Section 6.4)

- No impacts on plant growth, using OECD Guide 208
- Regulated (heavy) metals less than 50% of EPA prescribed threshold

The Biodegradable Products Institute (BPI), provides an independent certification program for products that meet all requirements of the ASTM D6400 standard

- Uses independent approved labs and reviewers
- Not based only upon manufacturer's claims



“The Proof is in the Label”

Additive Technologies



Biomaterial Additives



“Oxo” Degradable Bags



Plastic (PP or PS) Resin




“Degradable” Cutlery

Environmental Impact



Determining the Amount of Plastic and Compostable Plastic in Compost "Overs"



Study conducted on behalf of the Biodegradable Products Institute

October 2012

INTEGRATED WASTE MANAGEMENT CONSULTING, LLC
NEVADA CITY, CALIFORNIA



Photo: Nuria Vario

What are Plastics?



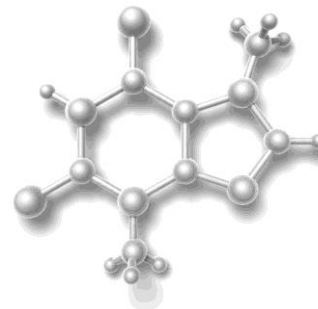
“**Plastic** is a material consisting of any of a wide range of [synthetic](#) or semi-synthetic [organics](#) that are [malleable](#) and can be [molded](#) into solid objects of diverse shapes. Plastics are typically [organic polymers](#) of high [molecular mass](#), but they often contain other substances. They are usually synthetic, most commonly derived from [petrochemicals](#), but many are partially natural”

- Wikipedia

A Disposable Culture Emerges



- Microbes utilize carbon substrates to extract chemical energy to support life processes.
- Certain polyesters (like Eco-Flex and PLA) have a chemical structure of $-O-CO-$. **These are “weaker” molecular bonds and are capable of being assimilated by soil microorganisms.**
- Polyethylene (traditional plastic bags) and other polyolefins have a C-C chemical structure. **These are “stronger” bonds and are not capable of being assimilated by soil microorganisms.**



New Opportunities in Recycling and Product Manufacture Eliminate the Environmental Hazards Inherent in the Composting of Plastic-Coated Paper Products

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April 2011



FIGURE 1. COMMON PLASTIC-COATED PAPER PRODUCTS.

“...there has been growing concern in the scientific community about the increased accumulation of plastic fragments in the environment, their absorption of persistent organic pollutants (POPs), their ingestion by organisms, and the human health and environmental consequences that may result”



“This study showed conclusively that micro-plastic fragments were shred from all plastic coated samples, whether single or double-coated. This means any plastic-coated paper product, even those that are partially screened out during the composting process, is contaminating the finished compost with plastics particles.”

Takeaways

- Plastic food service packaging made from traditional plastic is difficult to recycle, look to compost certified compostable food service packaging when possible.
- When using compostable food service plastic wares ensure they are in compliance to ASTM D6400 / ASTM D6868 certified compostable by the BPI
- Products made from traditional plastics do not fully biodegrade and should not be sent to a compost facility



Thank You!

Natur-Tec™

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