RRFB Research & Development Findings Symposium

Plastic Compostable Bags, Realities and Myths Paul Arnold, Maggie Hope-Simpson December 2, 2010

Content

- Definitions
- Criteria/standards
- Composting and plastics:
 - Bench scale results
 - Commercial scale results
- Conclusions & recommendations

Degradable/Biodegradable/Compostable/Plastic

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- Replaces non-compostable/biodegradable plastic
- Increases diversion
- Reduces litter
- Marketing advantage

-'s

- More expensive?
- Requires compost infrastructure
- Need to balance decompostability with designed product performance (strength, moisture, shelf-life)



- Oil based
- Breaks down with chemical (not biological) reactions
- More dependent upon sunlight (UV), heat and chemical activation energies
- Wide range of performance due to wide range of exposure conditions.

Biodegradable Plastic

- Plastics that decompose in natural aerobic or anaerobic conditions
- Plant or animal sources
- Plastic is metabolized by microbes
- Two sources:
 - Bio-plastics from renewable raw materials
 - Petroleum-based sources
- Chemical composition:
 - Aliphatic polyesters (hydrolysable ester bonds)
 - Polyvinyl alcohol
 - Starch derivatives
 - Cellulose esters

Compostable Plastic

- Must be able to break down into carbon dioxide, water and biomass at the same rate as paper (ASTM)
- It needs to look like compost, should not produce any toxic material and should be able to support plant life
- Compostable items are made from plant materials such as corn, potato, cellulose, soy and sugar.

ASTM Standards for Biodegradable Plastics

- ASTM D6400-04 Standard Specification for Compostable Plastics
- ASTM D6868 03 Standard Specification for Biodegradable Plastics Used as Coatings on Paper and Other Compostable Substrates
- ASTM D7081 05 Standard Specification for Non-Floating Biodegradable Plastics in the Marine Environment
- ASTM D5511 02 Standard Test Method for Determining Anaerobic Biodegradation of Plastic Materials Under High-Solids Anaerobic-Digestion Conditions
- ASTM D5526 94(2002) Standard Test Method for Determining Anaerobic Biodegradation of Plastic Materials Under Accelerated Landfill Conditions

What are "Controlled Composting Conditions?"

- Subjective
- A varied as the number of compost facilities
- As varied as the diversity of compost feedstocks

Composting.....

- Biological
- Exothermic
- Dynamic
- Depends on:
 - Air (oxygen)
 - Food (C:N)
 - Water
- Vast differences in performance based on management style





Test Project

- Focus of compostable plastic film
- Test on:
 - Commercial scale (Cumberland, Victoria Counties)
 - Bench scale
- Objective: to determine the compostability of compostable bags in a typical compost process

Cumberland Pilot

 4-week collection of organics in compostable bags from 200 households and standard collection from 200 additional households

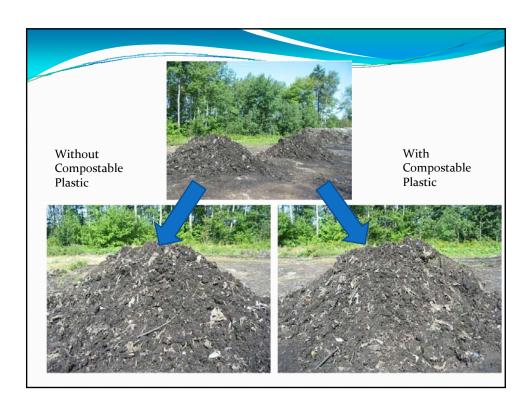


- Educational brochure and bags provided to participants
- SSO processed at Cumberland facility:
 - 3-4 months in static piles occasionally moved with loader
 - 4-6 months in outdoor windrows moved with loader
 - Screened

Issues

- Collection logistics difficult
- Differentiating non-compostable & compostable plastic

Insufficient quantity to represent actual composting process







Results

- Organic waste completed active stage of decomposition without significant change in plastic (1 month)
- Material currently curing to determine if further decomposition will occur



Conclusions

- The rate of decomposition of biodegradable plastic film depends upon the compost technology.
- The rate of decomposition of compostable plastic is (far) less than the rate of decomposition of typical organic waste.
- Notwithstanding relative latent rate of decomposition, the use of compostable plastic (film) will not be practical until all film is compostable; success based on widespread adoption.
- The wide distribution and use of biodegradable plastic film is ahead of effective compost infrastructure.

Recommendations

- That manufacturers of compostable plastic continue to seek to accelerate rates of decomposition of their product that is more consistent with composting rates.
- That performance tests continue to be run under various composting regimes to determine which composting technologies are more effective.
- That tests for standards be reviewed to better match practical operations with bench scale references.
- Continue to collect experiences from operating facilities.

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