RRFB Research & Development Findings Symposium

Plastic Compostable Bags, Realities and Myths

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Content

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

Degradable/Biodegradable/ Compostable/ Plastic

+'s

- 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)

Degradable Plastics

- 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

Available Technologies

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

Without Compostable Plastic

With Compostable Plastic

Bench Scale Test

- 70-L reactor
- Aeration/agitation on demand
- Thermophylic 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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