

## COMPOSTING MATTERS

by Paul van der Werf

*"A bag must be constructed so that it does not decompose on the shelf or while in use."*



# The Decomposition of Pandora's Bag

## An Overview of Degradable Plastic Bags — Part 1

There has been in a considerable increase in the composting of source-separated household organic wastes in various jurisdictions across the country. What I like to call first generation programs — which typically include an aerated 240-litre cart and special kitchen container — have been in operation in various locales since the early 1990s. This system relies on residents to dispose of food scraps in the kitchen container and empty these directly into the cart.

The second generation programs (many taking place in densely populated areas) mostly rely on the use of an approximately 40-litre container and kitchen container, although plastic bag programs exist as well.

To get around the unfortunately named "yuck factor" some municipalities have allowed residents to line the kitchen container and in some cases

the collection container with plastic bags. If composting is the selected management option, these bags end up at the composting facility.

To many the mere presence plastic bags at a composting facility is viewed as sacrilege because it has the potential to impact the final compost quality (through the incomplete removal of the plastics). However, it has been demonstrated with some regularity that the removal of plastic bags from the compost system is a solvable engineering exercise, though it adds some operational costs in the form of additional upfront processing, residual screening and disposal.

The City of Toronto, for all the criticism that is heaped on it, has made significant inroads into maximizing organic waste diversion by allowing residents to use plastic bags as liners. It has been demonstrated that allow-

### Definitions of the Various Types of Degradable Plastics

Plastic Type	Method of Degradation
<b>Water Soluble†</b>	Materials that are soluble in water, usually within a specific temperature range and then bio-degrade through the action of micro-organisms
<b>Photo-degradable†</b>	Materials that degrade under the action of ultra violet (UV) light such that the material loses strength and fragments into minute particles.
<b>Oxo-degradable/ Bio-degradable†</b>	Materials that undergo degradation via a multiple stage process using a chemical additive to initiate the degradation, which may be triggered by Ultra-Violet (UV) sunlight, heat and/or mechanical stress with remnants then going through bio-degradation over time
<b>Biodegradable**†</b>	Materials capable of undergoing biological anaerobic or aerobic decomposition by the action of micro-organisms such as bacteria, fungi and algae under conditions naturally occurring in the biosphere
<b>Compostable*</b>	Materials that undergo degradation by biological processes during composting to yield CO <sub>2</sub> , water, inorganic compounds and biomass at a rate consistent with other compostable materials in commercial/industrial conditions

† Dr. Fred Edgecombe, Canadian Plastics Industry Association — personal communication

\* Adapted from ASTM D6400 Standard Specification for Compostable Plastics

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ing these bags increases participation and overall diversion rate. If ultimately it does not impact the quality of the finished compost — which it does not appear to do — and they are willing to pay the incremental costs to deal with this, then I would ask: What is the problem?

In some communities there has been a push to use liners that are compostable, be they plastic or paper. The critical advantage in using these types of materials is that they should reduce operating costs at a composting facility because bag removal is no longer an issue. The other part of the equation, however, is that the costs of these bags are being off-loaded to residents. (Although it should be noted there's nothing wrong with using the kitchen container without a liner and washing it after use!)

The issue of degradability of plastic liners has at times opened a very large “Pandora's bag” of confusion featuring infighting between degradable bag manufacturers at industry conferences and a lot of confusion for municipalities that want to allow the use of these types of bags.

Some clarity is in order as it pertains to the use of compostable liners for use in source separated organic waste programs.

This article explains some of the different types of degradable plastics used to make bags as well as specifications to define degradable plastics that are compostable.

In the next edition of this magazine (August/September) I'll explain possible certification programs and examples of communities allowing degradable plastic bags in composting programs.

### Degradable bags defined and explained

Degradable plastic bags are made from degradable plastic film of naturally occurring or synthesized biodegradable polymers.

The critical potential advantage to using degradable plastic bags is that they do not need to be removed at the beginning or end of the composting process. The key to realizing this advantage is that a degradable plastic should become part of the composting process — decomposing along with organic wastes — and not be present in the final compost product.

A good deal of the confusion in degradable plastics arises because there are a number of different mechanisms — physical, chemical and biological — that can result in their decomposition. These different mechanisms

have different impacts on the decomposition of bags during composting.

A bag must be constructed so that it does not decompose on the shelf or while in use. At the composting facility, however, it must decompose along with the rest of the organic wastes.

The Table presents an overview of the various types of degradable plastic films on the market.

The American Society for Testing and Materials (ASTM) established a Standard Specification for Compostable Plastics in 1999, which was updated in 2004 (ASTM D-6400).

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*"If it doesn't impact the quality of the finished compost, what is the problem?"*

The intent of this specification was to establish requirements for labeling of materials and products, including packaging made from plastics, as "compostable in municipal and industrial composting facilities." The basic requirements of this specification include disintegration during composting, inherent biodegradation, and no adverse impacts on ability of compost to support plant growth.


The key is that the plastic should biodegrade in a manner similar to comparable composting materials.

There are a number of tests that must be undertaken to fulfill the detailed requirements of this specification.

Ultimately it's only the plastics which pass these tests that can be called compostable; the rest degrade in some fashion may or may not work at a compost facility. They only bring confusion to the marketplace.

A number of organizations administer and oversee whether or not a degradable plastic film is compostable. Their work culminates in certification of compostable plastic bags and the use of some type of logo.

For instance, the Biodegradable Plastics Institute (BPI), an American organization, is a multi-stakeholder association with members from government, industry and academia. It functions, in conjunction with the U.S. Composting Council (USCC) as a certifying body for compostable plastics through its Scientific Review Committee. Upon successful completion of testing from a list of approved laboratories, products can be approved to carry the "Compostable Logo."

There certainly is not universal approval with regard to how compostable plastics should be certified; in fact the views are quite polarized. My next column will explore the certification of compostable plastic films in greater detail. 

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