# HOUSEHOLD ORGANIC WASTE COLLECTION

Steven Cartlidge considers the pros and cons of degradable and biodegradable bags in waste collection.

The multiple varieties of degradable and biodegradable films and bags that are commercially available can cause private and public organisations significant problems when deciding on which best suits their cost requirements and performance expectations. In this article, we look at three areas that are increasing awareness of these products: chemical composition; degradability/ biodegradabilty/compostability; and product performance.

## CHEMICAL COMPOSITION

There are three classes of product: 100 per cent chemical (derived from petroleum oil), 100 per cent biodegradable (derived from annually renewable cultivated resources) and a mixture of both.

The petroleum-based polyethylene (PE) plastic bags have been used for decades, and this class of product sets the performance standards by which we judge new technologies, i.e. tear resistance versus film thickness versus cost. By adding a chemical degradation catalyst derived from petroleum oil to a PE plastic, another type of petroleum oil-based plastic is created.

Technologies supported by cultivating plant life include starch, polyester, polyalcohol and paper. These bio-based products primarily use organic sustainable raw materials in their manufacture, meaning that the raw materials can be easily renewed, time after time. A mixed technology is, for example, a physical mixture of PE and starch.

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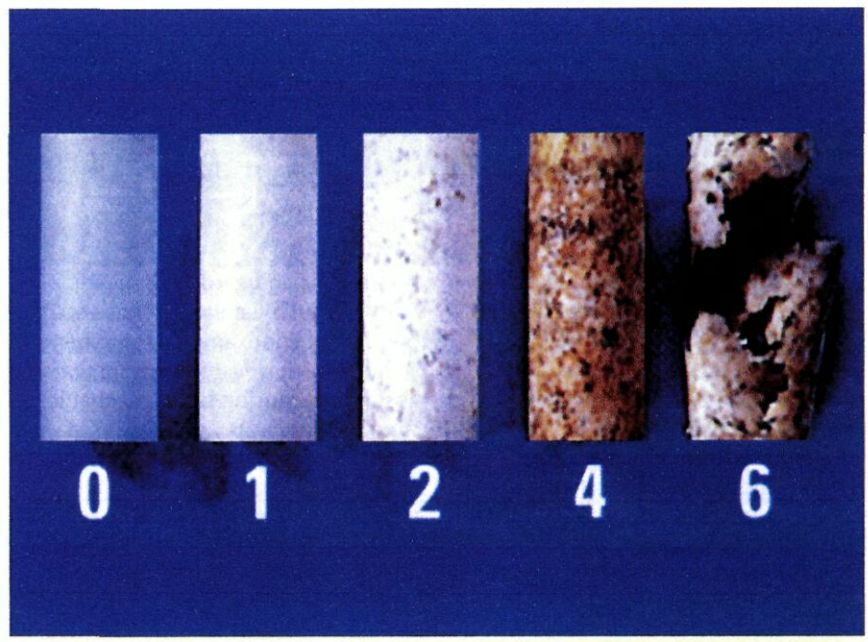


**Biodegradation of bio-polyester films over six weeks. From three to six months, depending on composting conditions, following contact with organic waste the bio-film completely disappears. The rate of biodegradation is the same as that of common garden compost**

These three classes of product have an environmental impact from cradle to grave that is beyond the scope of this article. The reason for promoting 100 per cent biodegradable technology is simply the ability to process the used 100 per cent biodegradable films and bags in a natural composting process with no harm to the environment and in doing so remove the massive problem of 'white plastic waste'.

To take commercial advantage of the benefits of 100 per cent biodegradable technology, the work processes applied today for using, collecting and disposing of plastic must be changed. For example, costs of processes such as collecting waste plastic for disposal, landfill charges and cleaning waste plastic prior to recycling must be offset against the higher price of new 100 per cent biodegradable technology.

## DEGRADABILITY, BIODEGRADABILITY AND COMPOSTABILITY

Plastic derived from petroleum oil will not degrade significantly, to the extent that after decades in landfill, the original article is still recognisable. Add a chemical degradation catalyst and the petroleum-derived plastic will degrade by chemical means, forming small bits of plastic that cannot be matched to the original article. When used in a composting process, this chemical catalyst plastic is ever present and is eventually deposited on open land as another form of landfill.

Plastic derived from 100 per cent biologicallysustainableresources has the benefit that it biodegrades in a composting process, making water and carbon dioxide with no

Filling a bio-polyester bag

Garden compost is often very dense

Kerbside collection point

residue. Although paper belongs in this category, the lifecycle for a cradle-to-grave process involving trees is a discussion point, not to mention the significant chemical processing necessary to manufacture the paper.

Plant-based polyester and starch technologies have been certified to European, American and Japanese standards for 100 per cent biodegradability, including ground water approval for the compost made with them. These technologies can be trusted as meeting the standard of 100 per cent biodegradability and customers should ask to see the relevant European test certificates (DIN 54 900 (composting process) and DIN 38412 Part 30 (ground water contamination)) from suppliers.

More importantly, the starch and polyester technologies perform closest to our expectations of a plastic film and bag product.

## PRODUCT PERFORMANCE

In like-for-like comparisons, certain 100 per cent biodegradable plastic technologies have a higher performance than the petroleum oil-derived plastics and some do not. The clear message to users is not to pre-judge the technology before it is used in a practical application. Starch technology was first to market, and most commercial experience from the collection of organic waste from households and gardens indicates that the starch technology has yet to be proven. For example, a number of starch films have suffered from water absorption causing lower mechanical strength.

The physical performance of 100 per cent biodegradable polyester technology is closer to that of accepted PE products and many starch products currently sold are mixed with bio-polyester to improve mechanical integrity. The bags used to dispose of organic household and garden waste must be able to carry a minimum weight and avoid tearing when pierced with rose bush cuttings. The bio-polyester bags meet these performance criteria at a lower film thickness compared with starch bags.

A significant performance criterion is the ability to fill the bag and leave it for collection on the kerbside for up to two weeks in urban regions and up to four weeks in rural regions. This 'useful life' property is important since the ability to collect biodegradable material every two weeks is less costly than weekly collections.

In combination with the collection frequency and useful life, the size of the bag and its filled weight are extremely important. Experience tells that the standard black household waste collection bags are filled with so much bulky packaging materials that their weight-to-size ratio is a minor issue.

In comparison, much of the organic waste from gardens is very dense (wet leaves or grass cuttings) and the route that is finding most success is to supply householders with bio-bags that hold up to 15kg of denser garden or food waste. The householder can use as many of the bags as are needed for the job in hand. An appropriate bag capacity can also prevent householders inadvertently over-filling and having problems carrying it.

Once the bio-bags have been in contact with organic waste the biodegradation process starts, and 100 per cent biodegradation will be achieved in three to six months, depending on the composting process.

## COMMERCIAL APPLICATION

Councils rely on the composting companies they work with to redefine the waste collection and disposal workflow when using bio-bags. An alliance of supplier (providing technical product information), the composting company (carrying out the work) and the council (responsible for waste collection and disposal) is essential to create a commercially viable solution to the collection of organic waste.

Successful councils have identified the collection and disposal of organic waste from households as a process that requires separate management. One solution is the use of bio-bags.

Writing a tender proposal for a mixture of standard PE bags that includes 100 per cent biodegradable bags as a side issue has proven to be unsuccessful.

Innovative local authorities have created manned temporary collection points for householders to deposit their organic waste, and this is one example of how the cost of collection can be reduced. However, this highlights the real need for educating the public. Successful local authorities begin organic waste collection campaigns by using all opportunities to highlight the benefits to householders, including leaflets, local newspaper interviews, surveys and relevant information printed on the bio-bag. Instructing the householder on what to send and not to send for composting is critical to the success of the entire process.

The ultimate product of the composting process is high quality

compost, free of petroleum-derived plastic waste that is an income stream for the local authority. No matter what the eventual outcome of cradle-to-grave analyses, the use of 100 per cent biodegradable plastic instantly removes society's current problems of plastic waste disposal and recycling.

The example of household organic waste collection is the first of many applications of 100 per cent biodegradable films and bags in waste management covering the public, agricultural and industrial sectors. A number of ongoing trials across sectors are demonstrating the true value of 100 per cent biodegradable polyester products.

We hope that the information contained in this article is helpful to gain a better understanding of biodegradable films, and that this will assist in finding the right partners and making informed and educated purchasing decisions. ■

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