

## Peer review summary

### EV0422 Assessing the Environmental Impact of Oxo-degradable Plastics

Report reviewed: Draft final report undertaken by Loughborough University  
Date: December 2009

Peer reviewers:

Richard Murphy, Imperial College  
Ramani Narayan, Michigan State University  
Richard Thompson, University of Plymouth

### Introduction

The role of peer review is to provide an independent review to the science commissioned by Defra, to ensure that policy is informed by a high-quality, robust evidence base.

The peer reviewers were asked to rate the report in ten categories and provide comments to justify the scores given. Feedback was then provided to Loughborough University who then revised the report on the basis of their feedback.

### Summary of Feedback and Subsequent Revision

Overall, the peer reviewers found the review and analysis to be comprehensive, pulling together a substantial body of relevant information to reach robust conclusions. Comments were mainly directed at strengthening the conclusions to clearly explain the consequences and implications of some of the information presented. The report was subsequently revised to take into account these comments.

	a	b	c	d	e (not applicable)
<b>1. Scope and Objectives</b>	✓✓				
<b>2. Quality of Approach.</b>	✓	✓			
<b>3. Assumptions</b>	✓				✓
<b>4. Evidence Base.</b>	✓✓				
<b>5. Analysis</b>	✓				✓
<b>6. Presentation of Evidence</b>	✓	✓			
<b>7. Use of Evidence</b>	✓	✓			
<b>8. Conclusions and Recommendations</b>	✓	✓			
<b>9. Reasoning</b>	✓	✓			
<b>10. Rigour and Robustness</b>	✓✓				

Figure 1. Summary of the peer reviewers overall rating (Note – one reviewer did not mark the report in this manner and instead provided qualitative comments, included in this summary)

### *Objectives*

Overall the peer reviewers found that Loughborough met the objectives of the research, in a way that was clear and appropriately detailed.

### *Quality of Approach and Analysis*

The approach, a combination of literature review and stakeholder consultation, was considered appropriate and clear for the scope of this study. One reviewer noted a lack of evidence on marine and freshwater habitats, indicated further references on this subject, and suggested that where limited information was available on a specific subject this should be more clearly indicated in the report.

### *Assumption*

One reviewer considered the main assumption of the report i.e. that the “*end-of-life of the oxo-degradable materials is the most important attribute*”, was appropriate in the sense that the materials have specific design features to influence its behaviour at this stage of the life cycle.

### *Data and Analysis*

Overall, the reviewers found that the evidence for the analysis was drawn from appropriate, recent and relevant studies in the field. Reviewers also pointed the authors towards additional references (see list below). Details about some of the specific studies were questioned, and in some instances it was suggested that more information be provided on the specific findings.

### *Presentation of Evidence*

The reviewers suggested that a summary table or diagram would help to present some of the arguments. Consequently, the executive summary was formatted to more clearly present the key findings and conclusions. Peer reviewers also highlighted several specific editorial issues to be addressed by the researchers. One reviewer pointed out that the corresponding ASTM standards for EN13432 are D6400 and D6868 (and not 5338, 5988).

### *Conclusions*

Overall, the reviewers suggested that the conclusions were consistent with the analysis presented but suggested it would help to expand on the logical consequences/ interpretation of the evidence. Two reviewers felt that the authors' conclusion that claims on oxo-degradable plastic are 'confusing' could have been strengthened to say that the claims are 'false', on the basis of the evidence presented. One reviewer remarked on the large uncertainty in degradation times, and pointed out that the bio-degradation of oxo-degradable plastics will release fossil carbon to the atmosphere. Another reviewer highlighted the importance of the disposal environment in any claim about the biodegradability of these plastics. Further, that the laboratory conditions and 'pre-treatment' under which the plastics are tested do not reflect the natural environment in which the plastics will actually be

exposed to. The potential consequences on health and the natural environment were also asked to be elaborated on.

### *Additional studies*

The review highlighted the following pieces of evidence that were incorporated in the next draft:

- Murphy, R. J., Davis, G. & Payne, M. Life Cycle Assessment (LCA) of Biopolymers for single-use Carrier Bags, report no. NNFCC 07-005, to the National Non-Food Crops Centre, pp 1-109 (2008), Imperial College London, UK.
- Browne, M. A., Dissanayake, A., Galloway, T. S., Lowe, D. M. & Thompson, R. C. Ingested microscopic plastic translocates to the circulatory system of the mussel, *Mytilus edulis* (L). *Environmental science & technology* **42**, 5026-5031 (2008).
- WRAP Research Report: Consumer attitudes to biopolymers, Banbury, UK (2007).
- WRAP Research Report: Biopolymer packaging in UK grocery market, Banbury, UK (2009).
- Mato, Y. *et al.* Plastic Resin Pellets as a Transport Medium for Toxic Chemicals in the Marine Environment. *Environ. Sci. Technol.* **35**, 318-324 (2001)
- 55. Teuten, E. L., Rowland, S. J., Galloway, T. S. & Thompson, R. C. Potential for Plastics to Transport Hydrophobic Contaminants. *Environ. Sci. Technol.* **41**, 7759-7764 (2007).
- Rios, L. M., Moore, C. & Jones, P. R. Persistent organic pollutants carried by synthetic polymers in the ocean environment. *Mar. Pollut. Bull.* **54**, 1230-1237 (2007).
- R. C. Thompson, C. J. Moore, F. S. vom Saal and S. H. Swan July 27, 2009 *Philosophical Transactions(of the Royal Society) B* titled “plastics, the environment, and human health” 364 (1526).
- Ogata, Y. *et al.* International Pellet Watch: Global monitoring of persistent organic pollutants (POPs) in coastal waters. 1. Initial phase data on PCBs, DDTs, and HCHs. *Mar. Pollut. Bull.* **58**, 1437-1446 (2009).