Are laboratory degradation proxy tests relevant to assess degradation of biodegradable polymers in the environment ?

Fannie Burgevin*†[1], Francesca De Falco[2], Winnie Courtene-Jones[2], Rachel Coppock[3], Matthiew Davidson[1], Matthiew Jones[1], Penelope Lindeque[3], Richard Thompson[2], and Antoine Buchard[1]

[1]University of Bath – University of Bath, Centre for Sustainable and Circular Technologies, Claverton Down, Bath, UK, United Kingdom

[2]University of Plymouth – University of Plymouth, Drake Circus, Plymouth, Devon, UK, United Kingdom

[3]Plymouth Marine Laboratory – Prospect Place The Hoe Plymouth PL1 3DH, United Kingdom

Abstract

The persistence of plastic in the environment has become a major issue in the last decades. Biodegradable products are presented by many as part of the solution to this global plastics crisis. However, until now, very little research examining the precise fate and impact in the open environment of biodegradable plastics have been conducted. Many products are not tested with sufficient standards before being put on the market and sold as biodegradable. Moreover, biodegradation tests do not represent well the reality in the open environment. Combination of degradation tests performed in well-controlled conditions in the lab, with tests in the field and biodegradation experiments with respirometer are essential to prove and assess the degradation and biodegradation potential of a material. This study is a collaboration between the University of Bath, the University of Plymouth and Plymouth Marine Laboratory and aims to provide better understanding of the fate of common biodegradable polymers (PLA, PBAT, PBS, PHBV...) in the environment (marine, soil and air exposure) by monitoring their degradation. By developing and comparing laboratory proxy experiments in different aqueous solutions and using controlled conditions such as temperature and pH with field degradation experiments, we want to assess the relevance of accelerated degradation lab tests frequently used in the literature.

Keywords: biodegradable polymers, degradation, lab simulations

*Speaker

†Corresponding author: famgb20@bath.ac.uk