From Marketing Hype to Scientific Clarity: Fighting Greenwashing With a New Rapid, Accurate, and Cost-Effective Method for Assessing the Biodegradability of Plastics

Martins, Marina (School: Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha)
Stecanella, Pedro Henrique (School: Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha)

Biodegradable polymers offer a solution to reduce the environmental impact of plastic waste. However, current biodegradability tests are both time-consuming and expensive, which hinders the development of new products and facilitates greenwashing, a deceptive promotion of products as environmentally friendly when they are not. This study proposes a new accelerated method that increases microbial activity by bioaugmenting the microorganisms present in the soil. Three different nutrient sources were tested to determine the most effective option. The growth of fungi and bacteria was analyzed for 7 days at 35°C, and CO2 production was monitored for 10 days at 58°C. Based on these results, a nutrient was selected for the next stage. In the subsequent 28-day test battery, different levels of soil bioaugmentation were tested to evaluate the degradation of microcrystalline cellulose (MCC), a positive reference for biodegradation tests. The test period was reduced from 180 days, according to ASTM D5338 and ISO 14855, to 28 days. The results show that the developed method is promising for accelerated testing, as MCC biodegradation reached 70%. To validate the method, two biodegradable polymers (MCC and PHB) and a non-biodegradable polymer (PP) were tested in parallel, and consistent results were obtained for these materials (67%, 61%, and 7%). Finally, the method was used to test commercial biodegradable products as a form of inspection. It was discovered that some of these materials did not biodegrade during the test period, indicating possible cases of greenwashing. The method developed by this study not only accelerates the validation of sustainable solutions but also serves as a powerful tool against greenwashing practices, guiding society towards a more sustainable future.

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