Plastics and Environment: Is There a Happy Medium?

Aziz, Z., Kyazze, G. and Keshavarz, T.

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In 2013 alone, 56 million tons of Poly(ethylene terephthalate) (PET) was produced worldwide. It's low cost of production, coupled with desirable properties such as high durability and plasticity has led to its extensive use in many different applications, from mobile phones to medical equipment to clothing. Demand for PET is steadily increasing year by year. However, PET is mineral-based and is a non-degradable material due to its synthetic nature. It accumulates within the environment globally, and this has led to collective global efforts for developing strategies to tackle the issue using various different options. Biopolymers such as Polyhydroxyalkanoate (PHA) present themselves as a possible solution and as suitable alternative to help manage the ever-rising global demand for plastics as well as alleviating the global environmental crisis arising from non-degradable plastics. Capable to be produced in an eco-friendly manner and possessing biodegradable properties, biopolymers should be set to replace non-degradable plastics, but despite extensive research on production of biodegradable plastics, the cost of their production is too high to lend them to large-scale production. This project focuses on economic production of PHAs. In this context, several approaches are adopted. Cheaper media such as orange peel, wheat bran, and spirulina with other quality enhancing ingredients have been tried; dual polymer production has been proved a possible option, and stage-wise fermentations, appart from fed-batch have been tried. Furthermore, downstream processing strategies such as planned time of harvest have the potential to attenuate adverse effects of extraction methods for PHA extraction. A holistic approach promises positive future for biopolymer industry.