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A sustainable way of degrading plastics

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Plastic takes more than 400 years to degrade; its low degradability, and increased production have led to its accumulation not only in the land but also in the ocean. It does not just hinder the aesthetic value of nature but also causes health issues, such as asthma, cancer, liver damage, kidney damage, etc. Microplastics present in the ocean are consumed by fishes and other marine organisms, which through the food chain could enter the human body and pose health risks. To degrade these synthetic plastics, microbes-related studies have been performed. Microbes have been isolated from dumping grounds from various parts of the world to understand their ability to eat plastic; many microbes were found to be potential in degrading plastics with plastic-dissolving enzymes present in them. But their degradation efficiency was low, which ranges between a few months to years to degrade a small piece of plastic. This is a nascent subject hence researchers are continuously working on it to find a way to increase efficiency. Ideonella sakaiensis is a bacterium that can degrade polyethylene terephthalate (PET), a kind of plastic used in food and beverage packaging, by secreting enzymes like PETase. An accidental discovery of the mutant form of PETase has shown 20% more efficiency than the natural one. Also, in the microbial consortium studied by the scientists, the Pseudomonas spp. have resulted in 40% weight reduction within 90 days. Such discoveries are opening a gate of hope for scientists to utilise microbes in the degradation of plastics. Moreover, a profound understanding of the depolymerases and the microbial metabolic pathways of depolymerisation products is essential. This understanding would contribute not only to the degradation of plastics but would also initiate an improved cyclic utilisation of plastics.

Keywords: Microbes, Plastic, Sustainable development, Environmental science, Biotechnology, Plastic degradation, Microbial degradation of plastics, Ideonella sakaiensis, Depolymerases

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