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Content

MICROBES AND MICROBIAL ENZYMES FOR DEGRADATION OF (BIO)PLASTICS

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Introduction: Plastic films, containers, and fibers are almost ubiquitous, making our life better, easier, and safer. However, the uncontrollable disposal of plastic waste has raised global concern. Plastic pollution is not a recent issue; it originated decades ago with the advent of industrial plastic production. While recycling, incineration, and other methods exist for managing plastic waste, unfortunately, landfilling remains the most prevalent "solution" adopted by many countries.

In response to the pressing issue of plastic pollution, a new scientific field has emerged, dedicated to employing innovative green methodologies inspired by nature's mechanisms. This approach centers around the discovery and identification of microorganisms with the ability to harness the carbon derived from plastic waste for their growth and survival. In the context of this research, we aim to accomplish two main objectives: isolating enzymes expressed by diverse microbial strains and exploring the potential of well-known hydrolytic enzymes in breaking down synthetic and biosourced polymers.

Methods: To optimize and improve biodegradation yields, our approach combines enzymatic and microbial plastic degradation with polymer treatment techniques. These techniques are designed to modify the structure of polymers, making them more accessible for hydrolysis and assimilation by microorganisms. After polymer hydrolysis, our concept emphasizes the recovery and utilization of the released compounds, which can be further converted into valuable bio-products through fermentation.

Results: Number of new enzymes, microorganisms and microbial communities has been isolated and characterized with the potential to degrade both single and mixed plastic substrates.

Conclusion: By adopting this multidisciplinary approach, we aim to establish a sustainable pathway for the efficient management of plastic waste. Through the transformation of polymers into high-added value products such as bioplastics, biopigments and biosurfactants, we contribute to a circular economy plan and mitigate the environmental impact associated with plastic waste.

Key words: microbial degradation; plastics; circular economy; bioplastics

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