Biodegradation of Polypropylene by Marine-Derived Fungi at Laboratory Scale

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ABSTRACT

This study investigated the capacity of two marine-derived fungal strains, which were grown in liquid-surface fermentation, to degrade plasticizers from polypropylene containers. *Paecilomyces variotii* (PM-001) and *Penicillium roqueforti* (PA-002) were grown for 12 days under hypersaline liquid-surface fermentation, with polypropylene commercial storage boxes being used as the fermenters. The biodegradation experiment was conducted in a modified KMV broth. Bis(2-ethylhexyl)-phthalate (BEHP), a common chemical additive, was identified as the only plasticizer in the culture containers used. It was observed that *P. roqueforti* was able to transform BEHP into diethyl- and dibutyl- phthalates, while *P. variotii* transformed BEHP into diethyl-, bis(2-methylpropyl)-, dibutyl-, bis(4-methylpentyl)-, dihexyl-, and dioctyl- phthalates. BEHP was not detected in either mycelium after the incubation period. The results suggest that *P. roqueforti* and *P. variotii* are highly efficient in degrading the BEHP plasticizer and can be used for bioremediation of polypropylene wastes. Therefore, efficient biotic degradation of polypropylene by marine-derived fungal strains could provide eco-friendly alternatives for degrading plastic additives, as well as leading to advances in the research and development of bioremediation strategies.