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Polyethylene degradation capability of *Schizophyllum commune*

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Tremendous increases in the manufacture and consumption of polyethylene, over recent decades have led to numerous environmental and economic concerns. This is the first comprehensive research on determination of Endolichenic Fungi (ELF), capable of degrading polyethylene substrates. The objective of this study was to identify the ability of various ELF, for the degradation of polyethylene in liquid media. Commercially available Low Density Polyethylene (LDPE) bags were used as the test material. ELF isolates cultured on Potato Dextrose Agar, were introduced into Mineral Salt Medium Broth containing LDPE strips. The isolate, *Schizophyllum commune* showed a positive growth response in the broth medium. The strips treated with this isolate, were tested for the reduction in dry weight, changes in peaks of Attenuated Total Reflection-Fourier Transform Infrared (ATR-FTIR) spectroscopy, reduction in tensile strain at break and changes in Scanning Electron Microscopic analyses. Results showed that isolate, reduced the weight of LDPE strip by 10.54%, after 21 days of incubation, while control showed 0% reduction. The control LDPE strip on ATR-FTIR analysis showed prominent peaks at 2916 cm^{-1}, 2848 cm^{-1}, 1463 cm^{-1} and 720 cm^{-1}. Changes visible in sample infrared spectra after 21 days of incubation, were the fluctuations in the percentage transmittance of above peaks and formation of new peaks at 1740 cm^{-1}, 1215 cm^{-1} and 1046 cm^{-1}. The tensile strain at break, of treated strips, reduced by 27.41%, after 21 days of incubation while control showed 0% reduction. The presence of pits and cavities, in Scanning Electron Micrographic images, suggested the penetration of fungi, into the LDPE matrix, during degradation. The occurrence of several non-uniformly scattered whitened areas and erosion zones, indicated the surface erosion of LDPE strips, in degradation. These changes were not observed in the control LDPE strips. This study provides insight into the role of *Schizophyllum commune* towards solving the dilemma of polyethylene wastes, through biodegradation.

Keywords: Endolichenic fungi, Degradation, Low density polyethylene

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