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Isolation and characterization of new bacterial 1 strains degrading low-density polyethylene

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Plastics have become indispensable in everyday life due to their properties. For this reason, the accumulation of polymer waste in the natural environment is becoming a serious global problem. The aim of the research was to isolate microorganisms capable of biodegrading plastics. The studies focused on the biodegradation of low-density polyethylene, the most common polymer. Seven and five bacterial strains were isolated from the landfill and compost, respectively. The morphological and biochemical characteristics of the isolates were determined. The isolates were able to survive in an environment where the only carbon source was LDPE, but no increase in biomass was obtained. However, analysis of the spectra obtained by the ATR-FTIR method showed the formation of chemical changes on the polymer surface. Bacterial biofilm formation was visualized by scanning electron microscopy. The toxicity of plastic biodegradation products in a liquid environment was tested and their safety for plants was confirmed. However, these biodegradation products have acute lethal toxicity for the Daphnia magna. LDPE films were pretreated with H_2O_2, HNO_3, or heat. The biodegradation of HNO_3-treated LDPE by isolated bacteria was the most significant. The weight loss was approximately 8%, and 6%, for landfill and compost-isolated bacterial strains, respectively.

Metryczka

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