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FEASIBILITY STUDY ON MICRO-POLYETHYLENE DEGRADABILITY BY MIXED MICROBIAL CONSORTIUM ISOLATED FROM A LANDFILL SITE

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Due to increasing use and disposal of plastics or micro-bead, micro-plastics (MPs) contamination threatens the aquatic and marine ecosystem. MPs can effect on cell viability, cell morphological change, or cause endocrine hormone disturbance phenomena. They can also migrate long distance by local wind or ocean current, adsorbing persistent organic pollutants, heavy metals and extraneous cell on their surface that can adverse effect on aboriginal organisms. While recent studies focused on the distribution and ecological effect of these pollutants, there is still a comparative lack of knowledge about their biological decomposition mechanism and biodegradability. In this study, the biodegradability of polyethylene (PE) has been investigated by using the mesophilic mixed microbial consortium isolated from the practical landfill site in Incheon, Korea. PE is dominant type of polymer component of MPs. PE ($H(CH_2CH_2)nH$) with a medium density of 0.94 g/mL (at 25) was purchased from Sigma-Aldrich (USA). PE particles were white and amorphous granular shape sized in the range of approximately 200 to 600μm in a diameter. Mixed microbial consortia were identified as *Brevibacillus parabrevis and Paenibacillus chitinolyticus*. For PE biodegradation test, 1 mL of mixed culture (O.D600=1.2) were inoculated in the 100 mL of freshly autoclaved Basal medium containing 100 mg of PE as the carbon source. The cultivation was carried out at 30 and 150 rpm. The decomposition was analysed through the measurement of weight loss, scanning electron microscope (FE-SEM 4300 SE, Hitachi) and fourier transform infrared spectroscopy (FT-IR, VERTEX 80V, Bruker). After 60 days of decomposition, dry weight loss of PE was 14.7% and mean particle size decreased from 224.57μm to 175.74μm. From the SEM images, some microbes were strongly attached on the PE surfaces verifying that they can have the potential of PE utilization.

Biography

Seon-Yeong Park has been studying soil improvement and water resource storage technologies such as evaluation of neutralization ability of acid soil and artificial recharge technology of groundwater in the Soil and Groundwater Environment Laboratory at Inha University. She is also studying the environmental impacts and decomposition mechanism of micro pollutants i.e., pharmaceuticals and micro plastics.

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