Isolation and Identification of Microplastics and Indigenous Soil Bacteria for Enhancing Biodegradation Potential in Terrestrial Environments

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Microplastic pollution presents a significant environmental challenge, particularly in soil ecosystems, where its effects on microbial communities remain poorly understood. This study aimed to extract and identify microplastics from soil samples and isolate native soil microbes for potential biodegradation applications. Microplastics were extracted using a saline solution, centrifugation, and filtration, and analyzed using spectrophotometer and UV-Vis spectroscopy. Soil bacterial isolates were cultured on Luria Broth agar plates and incubated at 37°C and room temperature to assess growth. Colony metrics, including count and coverage area, were quantified using MicrobeJ and converted to data through Excel for comparative evaluation. Spectrophotometer and UV-Vis spectroscopy confirmed the presence of microplastics in soil samples, with UV-Vis analysis at 230 nm showing higher absorbance in treated samples compared to controls, validating the extraction method. Bacterial colony growth increased substantially over two days of incubation, with notable expansions in colony count and coverage area. These results suggest that native soil microbes can thrive under both warm and room temperatures. Furthermore, the findings highlight the potential of indigenous bacteria to degrade microplastics in soil ecosystems. This research emphasizes the dual challenge of microplastic persistence in soils and its influence on microbial community dynamics. It also underscores the potential for leveraging native microbes in bioremediation strategies to mitigate microplastic pollution in urban areas, agricultural fields, and landfills. Future work will focus on optimizing microbial degradation ways to enhance their effectiveness in addressing microplastic pollution in the environments.

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