Screening, Identification and Biodegradability of White Pollution-Degrading Bacteria from Cockroach

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Cockroach is considered to be one of the most successful insects on the earth because of their fast reproduction, strong resistance and wide appetite including even plastic products. However, it remains unknown whether white-pollution-degrading bacteria exist in cockroach intestine. In this project, white-pollution-degrading bacteria were enriched, screened and purified using the plastic foam, plastic gloves and plastic bottles as the sole carbon source, and then with plasticizer i.e. dibutyl phthalate (DBP), and polyethylene (PE), respectively. One DBP-degrading bacteria strain (named as SW-D3) and one PE-degrading bacteria (named as SW-P1) were isolated. Through morphological, physiological and biochemical characteristics and 16S rDNA phylogenetic analysis, SW-D3 was identified as Acinetobacter johnsonii, and SW-P1 as Nocardia sp. The optimum growth condition of SW-D3 is 0.1% DBP, 30 ?, pH7.0; whilst the optimum PE concentration of SW-P1 is 2%. Meanwhile, no growth was found in the control medium without DBP or PE. In the medium containing plastic film, after inoculated with SW-P1 for 15 d, a large number of bacteria were observed to be embedded in the plastic film or attached to the surface of the plastic film by scanning electron microscopy, the surface of the film was rough, and began to be damaged, after 60 d, the membrane of the inoculated group was damaged and cavity appeared. In conclusion, two white-pollution-degrading strains were isolated from the cockroach intestinal contents, one is Acinetobacter johnsonii SW-D3, the other is Nocardia sp. SW-P1. Both could use DBP and PE as the sole carbon source, respectively, suggesting their potential in white-pollution control.

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