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WHOLE CELL BIOREPORTER FOR THE ESTIMATION OF OIL CONTAMINATION

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Abstract

Oil contamination has been one of the most common environmental pollution due to its threat to both human health and ecosystems. It is difficult for the application of conventional chemical analysis to detect oil contamination *in-situ*, estimate bioavailability and rapidly assess the environmental risk. In this study, two bioreporters were employed for the rapid and direct detection of oil content and genotoxicity in a cutting oil contaminated site in China. *Acinetobacter baylyi* ADPWH_alk and ADPWH_recA are chromosomally-based bioreporter for the detection of alkanes and genotoxicity separately. The reporter gene cluster *luxCDABE* enabled cells to express bioluminescence in the presence of contaminants. Calibration curve of bioreporter response to oil in the soils illustrated a log-log linear relationship between oil content and bioluminescence expression, indicating that whole cell bioreporter can be used as a semi-quantitative analysis method to estimate the oil contamination. The oil contamination in soils detected by ADPWH_alk (5760 and 1090 mg/kg) were comparable with those obtained by GC/MS (7070 and 1490 mg/kg). Furthermore, the genotoxicity bioreporter ADPWH_recA showed that the ecological genotoxicity of the soil samples were equivalent to 33-36 mg mitomycin C per kilogram soils. The results suggested that bioreporter sensing could be a rapid, simple, low-costly and *in-situ* detection method with unique ability for the detection of toxicity and bioavailability, and it can be a useful and complementary tool to chemical analysis.

Key words: Acinetobacter baylyi ADP1, alkane, bioreporter, cutting oil, genotoxicity, mineral oil, oil contamination

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