

## Development of Microorganisms Mediated Bioremediation Technique for Used Lubricating Oil Contaminated Soil

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Contamination of soil with Used Lubricant oil (ULO) has become an emerging environmental threat due to possible negative impacts of ULO on different ecological receptors. Therefore, remediation of ULO contaminated soils using novel and economically feasible technique is an urgent requirement. However, drawbacks in the conventional soil remediation measures have led the development of bioremediation techniques using naturally found microorganisms isolated from ULO contaminated soil. Hence, the present study aimed to characterize the isolated fungal strain with ULO degrading potential. Further, a comparative analysis of the ULO biodegradation ability of the isolated strains, *Aspergillus fumigatus* RUH<sub>8</sub> and *Brachy bacterium conglomeratum* RUH<sub>1</sub>, total microbial activity (TMA), and *Allium cepa* toxicity assay was performed for bioremediated soil. The experiments were carried out under laboratory-scale microcosms with 1-5% w/w contamination levels of ULO. Results indicated that a time-dependent increase in the biodegradation percentages of *B. conglomeratum* and *A. fumigatus* inoculated treatments. Following 35 days, the highest biodegradation percentages of *B. conglomeratum* and *A. fumigatus* were 77.63% and 70% respectively at 1% contamination levels. A concentration-dependent reduction of TMA was observed in two individual strains, *A. fumigatus* and *B. conglomeratum*. Compared to *A. fumigatus*, the lowest root growth inhibition (REI) and chromosomal inhibition (CA) was observed in *B. conglomeratum* mediated bioremediated soil. The calculated percentages of REI and percentages of CA in *B. conglomeratum* mediated bioremediated soil were, 18.27, 41.83, 43.27, 49.52, and 59.89 and 1.0, 1.5, 2.25, 3.0, and 3.5 respectively at 1-5% w/w contamination level. Therefore, the findings of the study concluded that *B. conglomeratum* has the potential to biodegrade and reduce the toxicity of ULO compared to *A. fumigatus* highlighting the species-specificity of the biodegradation efficiency.

**Keywords:** *Aspergillus fumigatus*, Bioremediation, *Brachy bacterium conglomeratum*, Toxicity, Used lubricating oil